

PROJECT MANUAL
BID DOCUMENTS
ISSUED FOR CONSTRUCTION

CHEROKEE HARD ROCK CASINO 4
CATOOSA, OKLAHOMA

PROJECT #H17018.01

May 4, 2018

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Work covered by the Contract Documents.
 - 2. Use of premises.
 - 3. Owner's occupancy requirements.
 - 4. Work restrictions.
 - 5. Specification formats and conventions.

1.3 PROJECT INFORMATION:

- A. Project Identification:
 - 1. Project Location: Hard Rock Casino 4, Catoosa, Oklahoma.
- B. Owner: Cherokee Nation Entertainment, LLC
- C. Architect: Edmondson Reed Associates, 1401 S. Denver Avenue, Suite B, Tulsa, Oklahoma 74119.
 - 1. Associate Architect: JCJ Architecture, 120 Huyshope Avenue, Suite 400, Hartford, Connecticut, 06106.

1.4 WORK COVERED BY CONTRACT DOCUMENTS:

- A. The Work consists of construction of a new casino addition.
- B. The Work includes trades described in the complete project manual including but not limited to cast-in-place concrete, light gage steel framing, structural steel, carpentry, exterior insulation and finish system, single-ply membrane roofing, aluminum storefront, aluminum curtain wall, aluminum windows and doors, glazing, interior finishes, plumbing, electrical, heating-ventilation-air conditioning, electrical systems, lighting, low voltage systems, and other related systems.

1.5 ACCESS TO SITE

- A. General: Contractor shall have limited use of premises for construction operations as indicated on Drawings by the Contract limits.

- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways, sidewalks, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.6 COORDINATION WITH OCCUPANTS:

- A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 - 1. Architect will prepare a Certificate of Substantial Completion for the Work to be occupied prior to Owner acceptance of the completed Work.
 - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

- A. On-Site Work Hours: Subject to requirements of the Owner, work shall be scheduled as required and approved by the Owner to maintain the Project Schedule.
 - 1. Weekend Hours: As approved by the Owner.
 - 2. Hours for Utility Shutdowns: As approved by the Owner, minimum three business days notice.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than three days in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's written permission.

- C. Nonsmoking Facility: Smoking is not permitted on the site.

1.8 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 50-division format and CSI/CSC's "MasterFormat 2004" numbering system.
 - 1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.
 - 2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
 - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
 - a. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes:
 - 1. Procedures for handling requests for substitutions made after award of the Contract.

1.3 DEFINITIONS:

- A. Definitions used below are not intended to change or modify the meaning of other terms used in the Contract Documents.
- B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for "substitutions". The following are not considered substitutions:
 - 1. Revisions to Contract Documents requested by the Owner or Architect.
 - 2. Specified options of products and construction methods included in Contract Documents.
 - 3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.
- C. Substitutions requested by Bidders during the bidding period will not be accepted.

1.4 SUBMITTALS:

- A. Substitution Request Submittal:
 - 1. Requests for substitution will be considered if received within 60 days after Notice to Proceed. Requests received more than 60 days after Notice to Proceed may be considered or rejected at the discretion of the Architect.
 - 2. Submit 3 copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.
 - 3. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawings numbers.

4. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:
 - a. Statement indication why specified material or product cannot be provided.
 - b. Product data, including Drawings and descriptions of products, fabrication and installation procedures.
 - c. Samples, where applicable or requested.
 - d. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as performance, size, weight, durability, visual effect, specific features and requirements indicated.
 - e. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors, that will become necessary to accommodate the proposed substitution.
 - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
 - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
 - j. Cost information, including a detailed labor and material proposal of the net change, if any in the Contract Sum.
 - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
 - l. Include the Contractor's waiver of rights to additional payment or extension of time, that may subsequently become necessary because of the failure of the substitution to perform adequately.

B. Architect's Action:

1. Within one week of receipt of the request for substitution, the Architect will request additional information or documentation necessary for evaluation of the request.
2. Within 2 weeks of receipt of the request, or one week of receipt of the additional information or documentation, whichever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution.
3. Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.
4. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the product specified by name.
5. Acceptance will be in the form of a Change Order.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS:

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.

- B. The Contractor's substitution request will be received and considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect, otherwise requests will be returned without action except to record non-compliance with these requirements.
 - 1. Extensive revisions to Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of Contract Documents.
 - 3. The request is timely, fully documented and properly submitted.
 - 4. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
 - 5. The specified product or method of construction cannot be provided within the Contract Time.
 - a. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.
 - 6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.
 - 7. A substantial advantage is offered the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear.
 - a. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate contractors, and similar considerations.
 - 8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
 - 9. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.
 - 10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provides the required warranty.

- C. The Substitution request shall comply with the following requirements are met:
 - 1. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

2. Evidence that proposed product provides specified warranty.
 3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 4. Samples, if requested.
- D. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

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

Specification Title: _____ Description: _____
Section: _____ Page: _____ Article/Paragraph: _____

Proposed Substitution: _____
Manufacturer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
Installer: _____ Address: _____ Phone: _____
Trade Name: _____ Model No.: _____
History: New Product 1-4 years old 5-10 years old More than 10 years old

Differences between proposed substitution and specified product: _____

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

Reason for not providing specified item: _____

Similar Installation:

Project: _____ Architect: _____
Address: _____ Owner: _____
Date Installed: _____

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

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

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

Supporting Data Attached: Drawings Product Data Samples Tests Reports _____

SUBSTITUTION REQUEST

(After Award of Contract - Continued)

The Undersigned certifies:

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

Submitted by: _____

Signed by: _____

Firm: _____

Address: _____

Telephone: _____

Attachments: _____

A/E REVIEW AND ACTION

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

Signed by: _____

Additional Comments: Contractor Subcontractor Supplier Manufacturer A/E _____

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination Drawings.
 - 2. Administrative and supervisory personnel.
 - 3. Project meetings.
 - 4. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements.
- C. Related Sections include the following:
 - 1. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS:

- A. RFI: Request from Construction Manager seeking interpretation or clarification of the Contract Documents.

1.4 COORDINATION:

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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 Construction Manager'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.
 9. Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 SUBMITTALS:

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate required installation sequences.
 - c. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
 2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit four opaque copies of each submittal. Architect will return one copy.
 - a. Submit five copies where Coordination Drawings are required for operation and maintenance manuals. Architect will retain one copy; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.
 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.

- 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 and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys 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.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL:

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 - 1. Include special personnel required for coordination of operations with other contractors.

1.7 PROJECT MEETINGS:

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 - 3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule 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. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
 - 1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Construction Manager, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - 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. Preparation of Record Documents.
 - l. Use of the premises.
 - m. Work restrictions.
 - n. Owner's occupancy requirements.
 - o. Responsibility for temporary facilities and controls.
 - p. Construction waste management and recycling.
 - q. Parking availability.
 - r. Office, work, and storage areas.

- s. Equipment deliveries and priorities.
 - t. First aid.
 - u. Security.
 - v. Progress cleaning.
 - w. Working hours.
3. Minutes: Architect will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect 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. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. 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 parties who should have been present.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

- D. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Construction Manager'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 Construction Manager'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) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
 3. Minutes: Architect will record the meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Construction Manager'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.

- E. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner, 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 conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined 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.
 - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.8 REQUESTS FOR INTERPRETATION (RFIs):

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Construction Manager. RFIs submitted by entities other than Construction Manager will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Construction Manager's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.

3. Name of Construction Manager.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. Specification Section number and title and related paragraphs, as appropriate.
 8. Drawing number and detail references, as appropriate.
 9. Field dimensions and conditions, as appropriate.
 10. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 11. Contractor's signature.
 12. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: Form at end of this Section.
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow seven working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or RFIs with numerous errors.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Construction Manager to submit Change Proposal according to Division 1 Section "Contract Modification Procedures."
 - a. If Construction Manager 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.
- 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 Construction Manager disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
1. Project name.
 2. Name and address of Construction Manager.

3. Name and address of Contractor.
4. Name and address of Architect.
5. RFI number including RFIs that were dropped and not submitted.
6. RFI description.
7. Date the RFI was submitted.
8. Date Architect's response was received.
9. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

PART 1 - GENERAL1.1 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 submittals required for performance of the Work, including the following:
1. Construction Manager's construction schedule.
 2. Submittal schedule.
 3. Material and equipment suppliers warranty certifications.
 4. Shop Drawings.
 5. Product Data.
 6. Samples.
 7. Quality assurance submittals.
- B. Administrative Submittals: Refer to other Division 01 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
1. Permits.
 2. Applications for Payment.
 3. Cost Correlation Schedule. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
 4. Performance and payment bonds.
 5. Insurance certificates.
 6. List of subcontractors.
 7. MSDS (Material Safety Data Sheets).
- C. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Construction Manager's construction schedule.
 3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
- D. Coordinate work with that of all other trades affecting, or affected by work of this Section. Cooperate with such trades to assure the steady progress of all work under the Contract.

1.3 DEFINITIONS:

- A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
 - 1. Preparation of Coordination Drawings is specified in Division 1 Section "Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.
- B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.
- C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.
- D. Action Submittals: Written and graphic information that requires Architect's responsive action.
- E. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.
- F. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- G. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS:

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Construction Manager's use in preparing submittals.
 - 1. Architect will furnish Construction Manager one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record 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 2014, Microsoft Windows.
 - c. Each Contractor shall execute a data licensing agreement form "Release of CAD Files" included in Project Manual.
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.

1.5 CONSTRUCTION MANAGER'S CONSTRUCTION SCHEDULE:

- A. Construction Manager's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- B. Distribution: Following response to the initial submittal, print and distribute copies to the Architect. Maintain copies in the Project meeting room and temporary field office.
 - 1. When revisions are made, redistribute to the same parties, and maintain copies in the Project meeting room and temporary field office.
- C. Schedule Updating: Revise the schedule to coincide with the time period included with each Application for Payment. Submit revised schedules with each Application for Payment.

1.6 SUBMITTAL SCHEDULE:

- A. Within four weeks of award of the Contract for General Construction, prepare and submit a complete schedule of submittals.
 - 1. The schedule shall indicate by Trade the date by which final approval of each item must be obtained, and shall be revised as required by conditions of work, subject to Architect's approval.
 - 2. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Construction Manager's Construction Schedule.
 - 3. Arrange the schedule in the same sequence as the technical specification sections. Provide the following information:
 - a. Related Section number.
 - b. Scheduled date for the submittal.
 - c. Submittal category (Shop Drawings, Product Data, or Samples).
 - d. Name of the subcontractor.
 - e. Description of the part of the Work covered.
 - f. Scheduled date for the Architect's final release or approval.
 - 4. Submit product schedule in the following format:
 - a. PDF electronic file.
- B. Distribution: Following response to the initial submittal, print and distribute copies to the Architect. Maintain copies in the Project meeting room and field office.
 - 1. When revisions are made, resubmit to the Architect.
- C. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule every two to four weeks.

1.7 SHOP DRAWINGS:

- A. Submit newly prepared information drawn accurately to scale. Do not reproduce Contract Documents as the basis of Shop Drawings.

- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following Project specific information:
1. Dimensions.
 2. Identification of products and materials included by sheet and detail number.
 3. Compliance with specified standards.
 4. Notation of coordination requirements.
 5. Notation of dimensions established by field measurement.
 6. 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.
 7. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 8. Distribution: Furnish copies of the Architect's reviewed final submittal to others required for performance of constructions activities.
 - a. Furnish one (1) hard copy of all approved submittals to Owner.
 - b. Construction Manager is responsible for distribution to all Trades.

1.8 PRODUCT DATA:

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
 2. 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.
 3. Submit Product Data before or concurrent with Samples.
 4. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

5. Submit Product Data in the following format:
 - a. PDF electronic file.
6. Distribution: Furnish copies of the Architect's reviewed final submittal to others required for performance of construction activities.

1.9 SAMPLES:

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
 1. Mount or display Samples in a manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample. Include the following:
 - a. Specification Section number and reference.
 - b. Generic description of the Sample.
 - c. Sample source.
 - d. Product name or name of the manufacturer.
 - e. Compliance with recognized standards.
 - f. Availability and delivery time.
 2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
 - a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
 - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 - c. Refer to other Sections for Samples to be returned to the Construction Manager for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
 - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Construction Manager and shall be removed from the site prior to Substantial Completion.
 3. Preliminary Submittals (for initial selection of finishes): Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.
 - a. The Architect will review and return preliminary submittals with the Architect's notation, indicating selection and other action.

4. Quantity: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 1 set. The Architect will return that set marked with the action taken.
 5. Construction Manager shall maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
 - a. Sample sets may be used to obtain final acceptance of the construction associated with each set.
 6. Distribution of Samples: Prepare and distribute additional sets to others as required for performance of the Work.
- B. Field Samples (Mockups): Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.
1. Comply with submittal requirements. Process transmittal/submittal coversheet forms to provide a record of activity.

1.10 COORDINATION DRAWINGS:

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
 2. Indicate required installation sequences.
 3. Coordination Drawing requirements for mechanical and electrical installations. Refer to the following Sections for coordination requirements:
 - a. Section 200050 - General Conditions for Mechanical and Electrical Systems.

1.11 INFORMATIONAL SUBMITTALS:

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Submit Informational submittals in the following format:
 - a. PDF electronic file.
 2. Certificates and Certifications: Provide a notarized 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.
 3. Test and Inspection Reports: Comply with requirements in Division 1 Section "Quality Requirements."
- B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

- D. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.
- F. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.
- G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.
- H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- I. Preconstruction Test Reports: Prepare 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.
- J. Compatibility Test Reports: Prepare 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.
- K. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.
- L. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements. 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.
- M. Research/Evaluation Reports: Prepare 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.
- N. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Operation and Maintenance Data."

- O. Design Data: Prepare 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.
- P. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- Q. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service 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.
- R. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- S. Material Safety Data Sheets: Submit information directly to Construction Manager. If submitted to Architect, Architect will not review this information but will return it with no action taken.

1.12 MATERIAL AND EQUIPMENT SUPPLIERS :

- A. Along with the Construction Schedule and Submittal Schedule, submit documents from material and equipment producers proposed for use on this project, acceptance of conditions and warranty requirements as set forth in the Specifications. Failure to provide documentation may result in delay or rejection of payment for the labor and materials associated with the missing material and equipment certifications.
 - a. Documentation from material, or equipment suppliers, sales representatives or distributors is not acceptable.

1.13 QUALITY ASSURANCE SUBMITTALS:

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
 - 1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.
- C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Requirements."

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 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, through Construction Manager, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - 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. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay. Transmit submittals independently from other Project correspondence.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received. The Contractor through the Construction Manager will be notified if the Architect has determined to withhold action.
 3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
 - a. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- 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 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Construction Manager 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 10 days for review of each resubmittal.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 10 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor through the Construction Manager.
- D. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
1. Provide means for insertion to permanently record Construction Manager's review and approval markings and action taken by Architect.
 - a. Construction Manager's review and approval markings, and the action taken.
 - b. Contractor's review and approval markings, and the action taken.
 - c. Engineer's review and approval markings, and the action taken.
 - d. Architect's review and approval markings, and the action taken.
 2. Include the following information on the label for processing and recording action taken.
 - a. Project name.
 - b. Date.
 - c. Name and address of the Architect.
 - d. Name and address of the Construction Manager.
 - e. Name and address of the subcontractor.
 - f. Name and address of the supplier.
 - g. Name of the manufacturer.

- h. Number and title of appropriate Specification Section with revision number.
 - i. Drawing number and detail references, as appropriate, with revision number.
 3. Highlight, encircle, or "cloud" deviations, comments and/or questions which conflict with the Contract Documents to facilitate review.
 4. Collate multiple sheets or copies into sets.
 5. 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.
 6. 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. Submittal Transmittal: Transmit each submittal attached to a completed transmittal/submittal coversheet. The Architect will review submittals only if accompanied by a transmittal/submittal coversheet. Use sample form attached at the end of this Section.
 1. 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 numeric suffix after a dash (e.g., LNHS-061000.01-001).
 2. On the transmittal/submittal coversheet, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Construction Manager's certification that information complies with Contract Document requirements.
 3. For submittals requiring review by the Architect's consultants or engineers, forward submittals directly to the respective consultants or engineers. Send a corresponding copy of the transmittal/submittal coversheet to the Architect for tracking purposes.
 4. On each coversheet, each reviewer shall stamp "Received" and indicate the date received, in the box provided on the Transmittal/Submittal Cover Sheet. Reviewers include Construction Manager, Contractor, Consultants and Architect.
 5. The Architect will not accept submittals received from sources other than the Construction Manager.
 6. Reviewers shall stamp submittals with a "Received stamp indicating the date received as follows:
 - a. Shop Drawings: Stamp each individual drawing or sheet.
 - b. Product Data: Stamp front cover of bound literature.
 - c. Samples: Attach a self-adhering blank label and stamp the label.

3.2 CONSTRUCTION MANAGER'S REVIEW

- A. 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 Construction Manager's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- B. Proceed with execution of the Work, documented by applicable submittals, using only shop drawings, product data and samples indicating Architect's action.
- C. Submittal sent to the Architect without the Contractor's stamp of review, submittal shall be returned to the Contractor through the Construction Manager with no action taken by the Architect.
- D. The Construction Manager is responsible for confirming and correlating all quantities and dimensions, selecting fabrication processes and techniques of construction, coordinating his work with that of all other Trades.

3.3 ARCHITECT'S ACTION:

- A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.
 - 1. Compliance with specified characteristics is the Construction Manager's responsibility.
- B. Action Stamp: The Architect will stamp each submittal with a uniform action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
 - 1. No Exceptions: When the Architect marks a submittal "No Exceptions," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
 - 2. Amend As Noted: When the Architect marks a submittal "Amend As Noted," the Work covered by the submittal may proceed provided it complies with notations on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
 - 3. Resubmit: When the Architect marks a submittal "Resubmit," the Work covered by the submittal may proceed, except in those portions of the Work designated to be resubmitted. Revise or prepare a new submittal, responding to the notations. Resubmit without delay.
 - 4. Rejected: When the Architect marks a submittal "Rejected," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
 - a. Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress.
- C. Unsolicited Submittals: The Architect will not review, and will not return unsolicited submittals to the Construction Manager.

END OF SECTION 013300



Transmittal/Submittal Coversheet

\$

Contractor: _____

Project #H17018.01

Project: **Cherokee Hard Rock Casino 4**

Spec. Division _____

Submittal Number _____

Spec. Section _____

Subcontractor/Supplier _____

| QUANTITY | ITEM |
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Contractor Rec'd from Sub/Supplier Date: _____ Quantity Sent: _____

Sent to: JCJ Date: _____ Action: _____

Consultant: _____

cc: _____

Consultant: Rec'd from Contractor: Date: _____ Quantity Sent: _____

Sent to JCJ: Date: _____ Action: _____

JCJ: Rec'd from: Contractor Date: _____ Quantity Sent: _____

Consultant

Sent to Contractor: Date: _____ Action: _____

Architect's Distribution Main File:# **H17018.01**

Architect
JCJ Architecture

Project Representative:

Attn: ()

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|---|
| Action Key NET/No Exception AN/Amend as Noted RS/Resubmit R/Rejected |
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| Date received By .C.M. | Date Received By Consultant | Date Received By JCJ |
|------------------------|-----------------------------|----------------------|

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Administrative and procedural requirements for quality assurance, special testing, and quality control.
- B. The requirements of this Section apply to customized fabrication and installation procedures, not to the production of standard products.
- C. 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-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 quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- D. Related Sections include the following:
 - 1. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
 - 2. Divisions 01 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 ensure that proposed construction complies with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that completed construction complies with requirements. Services do not include contract enforcement activities performed by Architect.

- C. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- D. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 DELEGATED DESIGN:

- 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.

1.5 SUBMITTALS:

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, 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, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - 2. Description of test and inspection.
 - 3. Identification of applicable standards.
 - 4. Identification of test and inspection methods.
 - 5. Number of tests and inspections required.
 - 6. Time schedule or time span for tests and inspections.
 - 7. Entity responsible for performing tests and inspections.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.
- D. Reports: Prepare and submit certified written reports that include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.

5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Comments or professional opinion as to whether inspected or tested work complies with requirements of the Contract Documents.
 11. Ambient conditions at time of sample taking and testing and inspecting.
 12. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 13. Name and signature of laboratory inspector.
 14. Recommendations on retesting and reinspecting.
- E. Submit to Architect 3 copies of certified written report of each inspection, test or similar service.
1. Provide one copy to Owner's Representative.
 2. Provide additional copies of reports, as required for authorities having jurisdiction, to the Architect for distribution.
 3. Provide required number of copies to the Contractor for his record.
- F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 REQUIREMENTS:

- A. Inspection and testing services are intended to verify compliance with the requirements of the Contract Documents.
- B. Quality control services do not relieve the Contractor of responsibility for compliance with requirements of the Contract Documents. Requirements for the Contractor to provide quality control services are not limited by the provisions of this Section.
- C. Quality control services include inspections and tests and related actions including reports, performed by independent agencies and governing authorities, as well as by the Contractor. They do not include Contract interpretations and decisions rendered by the Architect.
- D. Specific quality control requirements for an individual unit of work is specified in the Section of the Specifications that includes that element of the Work. These requirements, including inspections and tests, cover both production of standard products, and fabrication of customized work. These requirements also cover quality control of the installation procedures.
- E. Inspections, tests and related actions specified are not intended to limit the Contractor's own quality control procedures which facilitate overall compliance with requirements of the Contract Documents.

1.7 RESPONSIBILITIES:

- A. The Contractor shall provide inspections, tests and similar quality control services, specified in individual Specification Sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity.
- B. These control services include those specified to be performed by an independent agency and not by the Contractor. Costs for these services shall be included in the Contract Sum.
- C. The Owner will engage and pay for the services of an independent agency to perform inspections and tests specified as the Owner's responsibility.

1.8 RETESTING:

- A. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
- B. Cost of retesting construction revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.

1.9 ASSOCIATED SERVICES:

- A. The Contractor shall cooperate with agencies performing required inspections, tests and similar services and shall provide reasonable auxiliary services as requested.
- B. Notify the testing agency sufficiently in advance of operations to permit assignment of personnel.
- C. Auxiliary services required include but are not limited to:
 - 1. Providing access to the Work and furnishing the incidental labor and facilities necessary to facilitate inspections and tests.
 - 2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
 - 3. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
 - 4. Providing the testing agency with a preliminary design mix proposed for use for material mixes that require control by the testing agency.
 - 5. Security and protection of samples and test equipment at the Project site.

1.10 COORDINATION:

- A. The Contractor shall coordinate the sequence of activities to accommodate required inspection and test services with a minimum of delay.

- B. The Contractor shall coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- C. The Contractor shall be responsible for scheduling inspections, tests, taking of samples and similar activities.
- D. The Contractor shall bear costs of removing and replacing work to accommodate scheduled inspections and tests.

1.11 QUALITY ASSURANCE:

- A. 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.
- B. 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.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and similar regulations governing the Work, nor interfere with local trade-union jurisdictional settlements and similar conventions.
- G. Testing Agency Qualifications: An agency with the experience and capability to conduct testing and inspecting indicated, as documented by ASTM E 548, and that specializes in types of tests and inspections to be performed.

- H. Preconstruction Testing: Testing agency shall perform preconstruction testing for compliance with specified requirements for performance and test methods.
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens and assemblies representative of proposed materials and construction. Provide sizes and configurations of assemblies to adequately demonstrate capability of product to comply with performance requirements.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Fabricate and install test assemblies using installers who will perform the same tasks for Project.
 - d. When testing is complete, remove assemblies; do not reuse materials on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, and to Owner's Representative 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.

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

1.12 QUALITY CONTROL:

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

- B. Contractor Responsibilities: Unless otherwise indicated, provide quality-control services specified and required by authorities having jurisdiction.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ the same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies and Owners Representative at least 48 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.
1. Testing agency will notify Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
 3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
 4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 5. Testing agency will retest and reinspect corrected work.
- D. 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.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that revised or replaced Work that failed to comply with requirements established by the Contract Documents.
- 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. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.

3. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 4. Do not release, revoke, alter, or increase requirements of the Contract Documents or approve or accept any portion of the Work.
 5. 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 quality-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. Submit schedule within 30 days of date established for the Notice to Proceed.
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.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION:

- A. Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate resulting imperfections, including flaws in visual qualities of finishes.
 - 1. Provide materials and comply with installation requirements specified in other Sections of these Specifications. Restore patched areas and extend restoration into adjoining areas in a manner that eliminates evidence of patching.
- B. Comply with the Contract Document requirements for cutting and patching.
- C. Protect construction exposed by or for quality-control service activities.
- D. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 DEFINITIONS:

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

- K. "Typical": Having or showing the characteristics, qualities of a kind, class or group so fully as to be a representative example.

1.3 INDUSTRY STANDARDS:

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS:

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. AABC - Associated Air Balance Council; www.aabc.com.
 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
 4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 7. ABMA - American Boiler Manufacturers Association; www.abma.com.
 8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
 9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 11. AF&PA - American Forest & Paper Association; www.afandpa.org.
 12. AGA - American Gas Association; www.aga.org.
 13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 15. AI - Asphalt Institute; www.asphaltinstitute.org.

16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.
26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWWA - American Water Works Association; www.awwa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.

59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).
69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dasma.com.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarroof.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.

103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.
127. MIA - Marble Institute of America; www.marble-institute.com.
128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.

145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFPA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.
155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFPA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steeltank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.

188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
193. TRI - Tile Roofing Institute; www.tilerroofing.org.
194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
203. WI - Woodwork Institute; www.wicnet.org.
204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
205. WWPA - Western Wood Products Association; www.wwpa.org.

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. DIN - Deutsches Institut für Normung e.V.; www.din.de.
2. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
3. ICC - International Code Council; www.iccsafe.org.
4. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.

12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.

6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES:

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

1.4 INFORMATIONAL SUBMITTALS:

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.

2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
1. Locations of dust-control partitions at each phase of work.
 2. HVAC system isolation schematic drawing.
 3. Location of proposed air-filtration system discharge.
 4. Waste handling procedures.
 5. Other dust-control measures.

1.5 QUALITY ASSURANCE:

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

1.6 PROJECT CONDITIONS:

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

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 8 feet (2.44 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts.
 1. Accessories: UV-inhibited, screen fabric, woven polypropylene, taped hems, grommets at 2'-0" centers.
 - a. Color: Green.
 - b. Opacity: 96 percent.

- B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails. Provide concrete bases for supporting posts.
- C. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- D. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- E. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES:

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

2.3 EQUIPMENT:

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

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

3.2 TEMPORARY UTILITY INSTALLATION:

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Install electric power service overhead unless otherwise indicated.
 - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

3.3 SUPPORT FACILITIES INSTALLATION:

- A. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION:

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Section 011000 "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings or requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install ribbon identification fencing located outside the drip line of trees to protect vegetation from damage from construction operations.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: As needed.
 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
 3. Fence Height: 8'-0".
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
- K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

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

3.5 MOISTURE AND MOLD CONTROL:

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 1. Protect porous materials from water damage.
 2. Protect stored and installed material from flowing or standing water.
 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 4. Remove standing water from decks.
 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 2. Keep interior spaces reasonably clean and protected from water damage.
 3. Periodically collect and remove waste containing cellulose or other organic matter.
 4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.

- c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL:

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including Division 1 Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes:
 - 1. Procedures governing the selection of products.
 - 2. Procedures for delivery, storage and handling.
- B. Related Sections include the following:
 - 1. Division 01 Section "References" for applicable industry standards for products specified.
 - 2. Division 01 Section "Closeout Procedures" for submitting warranties for contract closeout.
 - 3. Division 02 through 48 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS:

- A. Definitions below are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties", "systems", "structure", "finishes", "accessories", and similar terms. Such terms such are self-explanatory and have well recognized meanings in the construction industry.
- B. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material", "equipment", "system", and terms of similar intent.
- C. "Named Products" are items identified by manufacturer's product name, including make or model designation, indicated in the manufacturer's published product literature, that is current as of the date of the Contract Documents.
- D. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
- E. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.
- F. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

- G. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.
- H. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
- I. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

1.4 SUBMITTALS:

- A. Product List Schedule:
 - 1. Prepare a schedule showing products specified in a tabular form acceptable to the Architect. Include generic names of products required.
 - 2. Form: Tabulate information for each product under the following column headings:
 - a. Specification Section number and title.
 - b. Generic name used in the Contract Documents.
 - c. Proprietary name, model number, and similar designations.
 - d. Manufacturer's name and address.
 - e. Supplier's name and address.
 - f. Installer's name and address.
 - g. Projected delivery date or time span of delivery period.
 - h. Identification of items that require early submittal approval for scheduled delivery date.
 - 3. Coordinate the product list schedule with the Contractor's Construction Schedule and the Schedule of Submittals.
 - 4. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - 5. Completed Schedule: Within 60 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.
 - 6. Architect's Action: The Architect will respond in writing to the Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents.

1.5 QUALITY ASSURANCE:

- A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

- B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver, store and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration and loss, including theft. Comply with manufacturer's written instructions.
- B. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.
- C. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.
- D. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.
- E. Inspect products upon delivery to ensure compliance with the Contract Documents, and to ensure that products are undamaged and properly protected.
- F. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.
- G. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.
- H. Store products, subject to damage by the elements, above ground and under cover, in a weathertight enclosure with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.
- I. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- J. Protect stored products from damage.

1.7 PRODUCT WARRANTIES:

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

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
 - 3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION:

- A. General Product Requirements:
 - 1. Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at the time of installation.
 - 2. Provide products complete with accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.
 - 3. Standard Products: Where available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 4. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 5. Where products are accompanied by the term "as selected," Architect will make selection.
 - 6. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
 - 7. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
 - 8. Or Equal: Where products are specified by name and accompanied by the term "or equal", "or approved equal", "or approved" or "or as approved by the Architect," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

- B. Hazardous Materials:
 - 1. All material and equipment furnished under the Contract shall be free of asbestos, lead and polychlorinated biphenyl (PCB). Any material or equipment containing these hazardous materials shall be considered defective and shall be removed by the Contractor at his own expense.

2.2 PRODUCT SELECTION PROCEDURES:

- A. Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience.
- B. Procedures governing product selection include the following:
 - 1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.
 - 2. Semiproprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products indicated. No substitutions will be permitted.
 - 3. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of these products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Section on Product Substitutions to obtain approval for use of an unnamed product.
 - 4. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
 - 5. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements which are recommended by the manufacturer for the application indicated.
 - a. General overall performance of a product is implied where the product is specified for a specific application.
 - b. Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
 - 6. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
 - 7. Visual Matching: Where Specifications require matching an established Sample, the Architect's decision will be final on whether a proposed product matches satisfactorily.
 - a. If a satisfactory match cannot be made with specified products, comply with provisions of the Contract Documents concerning substitutions to select a matching product in another product category.
 - 8. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.
 - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

- b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.
- 9. Allowances: Refer to individual Specification Sections and provisions in Division 1 for allowances that control product selection, and for procedures required for processing such selections.

2.3 COMPARABLE PRODUCTS:

- A. Where products or manufacturers are specified by name, submit the following, in addition to other required submittals, to obtain approval of an unnamed product:
 - 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS:

- A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated.
- B. Anchor each product securely in place, accurately located and aligned with other work.
- C. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

END OF SECTION 016000

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes:
 - 1. General provisions, standards, and tolerances which apply to the Work of this Contract in the absence of stricter specified standards and tolerances.

1.3 LEVELING:

- A. Place work in correct position and, unless specifically called for otherwise, build and install parts of the work level, plumb, and square.
- B. No part shall be out of plumb, level, square, or correct position so much as to impair its function or the function of any part of the Project.
- C. No part shall be out of plumb, level, square, or correct position so much as to impair the aesthetic effect of the part or its effect on the Project as judged by the Architect.

1.4 JOINTS:

- A. Make joints tight and neat. If such is impossible, apply moldings, sealant, or other closure as directed by Architect.
- B. Allow for expansion and contraction.

1.5 FASTENERS:

- A. Under potentially damp conditions, provide galvanic insulation between different metals which are not adjacent on the galvanic scale.
 - 1. Fasteners for carpentry in potentially damp locations shall be stainless steel, aluminum, or hot dip galvanized steel.
 - 2. Fasteners for copper and brass in all locations and under all conditions shall be copper or brass.
 - 3. Fasteners for stainless steel shall be stainless steel.
 - 4. Fasteners for aluminum shall be stainless steel or aluminum.
 - 5. Fasteners for ferrous metals shall be galvanized or stainless steel.
- B. Fasteners on the exterior of a building, in cellars and crawl spaces, and other areas where dampness and corrosion can reasonably be anticipated, shall be one of the types specified above compatible with the materials involved.

1.6 PROTECTIVE FINISHES:

- A. Before installation, apply protective finish to items which are to be concealed. For example, paint corrodible mounting plates before installing parts over them.
- B. Paint aluminum embedded in masonry with bituminous paint.
- C. Coat concealed wood exposed to dampness with heavy coat of water repellent-toxic fungicide.
- D. Paint other concealed materials with same primer and finish specified for exposed surfaces. If concealed materials are fully covered, primer alone is sufficient.
- E. Concealed parts which are already corrosion protected need not be painted unless specified otherwise.

1.7 BLOCKING AND BRACING:

- A. Provide adequate blocking, bracing, nailers and fastenings to install the parts of the work securely. Installed parts shall, in general, be able to withstand 2 1/2 times the maximum anticipated load.
- B. Provide blocking, bracing, nailers, and fastenings which will not be subject to deterioration or weakening as the result of normal environmental conditions or ageing.

1.8 SUPPORTING BASES:

- A. Check Drawings, equipment details, and specifications for the requirements for bases, pads, and similar supporting structures.
- B. Provide such supporting structures whether or not shown on Drawings.

1.9 CRACKS:

- A. As part of the requirements for correction of work, repair cracks and other faults which occur as a result of settlement and shrinkage.
- B. Seal cracks and openings to make exterior of building weather tight.
- C. Fit materials tight to penetrations through wall and floor systems. Provide fire-stopping at rated systems to meet ratings noted on Drawings.

1.10 INSTALLATION OF MATERIALS:

- A. Inspect each product upon delivery and again immediately before installation. Do not install damaged or defective products, materials, or equipment.
- B. For each unit of work, examine substrate conditions before beginning installation. Correct unsatisfactory conditions before work proceeds.
- C. Mount individual units of work at industry-recognized mounting heights if not otherwise indicated. Refer uncertainties to Architect for resolution.
- D. Anchor work securely in place. Locate by measured line and level, organize for uniformity, visual effect, operational efficiency, durability, and similar benefit to Owner's use, and Architect's approval.

- E. Provide all required accessories for the proper installation, use, and service of each part of work.
- F. Secure work in place with positive anchorage designed and sized to withstand stress including vibration and racking.
- G. Adjust and operate all items of equipment leaving them fully ready for use.

1.11 REPAIR AND RESTORATION:

- A. Replace work which, because of construction activity, becomes unfit for use or unsightly.
- B. Promptly replace material and equipment damaged in construction activity.
- C. Restore finishes which are damaged, soiled, or otherwise made unsightly during construction.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

END OF SECTION 016200

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
1. Construction layout.
 2. Field engineering and surveying.
 3. General installation of products.
 4. Progress cleaning.
 5. Starting and adjusting.
 6. Protection of installed construction.
 7. Correction of the Work.
- B. Related Requirements:
1. Section 011000 "Summary" for limits on use of Project site.
 2. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.

1.3 SUBMITTALS

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

PART 2 - PRODUCTS (Not Used)PART 3 - EXECUTION3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017329

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
 - 1. Division 07 Section "Penetration Firestopping" for patching fire-rated construction.
 - 2. Division 07 Section "Joint Firestopping" for patching head-of-wall and perimeter-floor-to-curtain wall joints.
 - 3. Divisions 2 through 26 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
 - a. Requirements in this Section apply to mechanical and electrical installations. Refer to Divisions 22, 23 and 26 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.3 DEFINITIONS:

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other Work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS:

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - 2. Changes to Existing Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - 3. Products: List products to be used and firms or entities that will perform the Work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities: List utilities that cutting and patching procedures will disturb or affect. List utilities that will be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.
 - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - 7. Contractor's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE:

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 - a. Foundation construction
 - b. Bearing and retaining walls
 - c. Structural concrete
 - d. Structural steel
 - e. Lintels
 - f. Timber and primary wood framing
 - g. Structural decking
 - h. Stair systems
 - i. Miscellaneous structural metals
 - j. Exterior curtain wall construction
 - k. Equipment supports
 - l. Piping, ductwork, vessels and equipment
 - m. Structural systems of special construction

- B. Operational Elements: Do not cut and patch the following operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
 - 1. Primary operational systems and equipment.
 - 2. Air or smoke barriers.
 - 3. Fire-protection systems.
 - 4. Control systems.
 - 5. Communication systems.
 - 6. Conveying systems.
 - 7. Electrical wiring systems.
 - 8. Operating systems of special construction in Division 13 Sections.

- C. Miscellaneous Elements: Do not cut and patch the following elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 1. Water, moisture, or vapor barriers.
 - 2. Membranes and flashings.
 - 3. Exterior curtain-wall construction.
 - 4. Equipment supports.
 - 5. Piping, ductwork, vessels, and equipment.
 - 6. Noise- and vibration-control elements and systems.

- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. General: Comply with requirements specified in other Sections of these Specifications.
- B. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

3.3 PERFORMANCE:

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut existing construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete, Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

SEND OF SECTION 017329

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 contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for progress cleaning of Project site.
 - 2. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION:

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 8. Complete startup testing of systems.
 9. Submit test/adjust/balance records.
 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 11. Advise Owner of changeover in heat and other utilities.
 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
 13. Complete final cleaning requirements, including touchup painting.
 14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify the General Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify the General Contractor of items, either on General Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION:

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report and warranty.
 5. Consent of surety to final payment.
 6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify the General Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify the General Contractor of construction that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. The Architect will invoice the Owner for services performed in inspections beyond the original inspection and the first reinspection. The Owner will, in turn, pass this cost on to the General Contractor and require a "deduct" Change Order due to the Owner.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST):

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

1.6 WARRANTIES:

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with the General Contractor.

- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of General Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS:

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

PART 3 - EXECUTION

3.1 FINAL CLEANING:

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - 1. Sweep, dust, wash, and polish all finished surfaces. This includes cleaning of the Work of all finished trades where needed, whether or not cleaning for such trades is included in their respective Sections.
 - 2. Each Subcontractor for mechanical and electrical work, including Plumbing, HVAC, Fire Protection, and Electrical Work shall clean materials and equipment for which they are responsible, leaving the Work in a finished and clean state.
 - 3. Final cleaning shall be performed for each phase as they are completed.

- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Replace parts subject to unusual operating conditions.
 - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - q. Clean ducts, blowers, and coils if units were operated without filters during construction.

- r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700

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. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

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 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 Construction Manager.
 - 6. Name and contact information for Contractor.
 - 7. Name and contact information for Architect.
 - 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 9. Cross-reference to related systems in other operation and maintenance manuals.
- 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 (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section 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 (215-by-280-mm) 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 a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

- 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 Section 017839 "Project Record Documents."

- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of the Contract, including 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.
 4. Miscellaneous record submittals.
 5. Data Retrieval Sheets.
- B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for general closeout procedures.
 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of products in those Sections.

1.3 CLOSEOUT SUBMITTALS:

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and one of file prints.
 - 3) Submit record digital data files and one set(s) of plots.
 - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
 - 3) Submit record digital data files and three set(s) of record digital data file plots.

- 4) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy, and one copy of annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one paper copy, and one copy of annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit one paper copy, and one copy of annotated PDF electronic files and directories of each submittal.
- E. Data Retrieval Sheets: Submit one paper copy and one electronic copy of Data Retrieval Sheets.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS:

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. 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 the 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. Before completion of the Work, and when directed by the Architect, the Construction Manager and all indicated subcontractors shall perform the following:
1. Transcribe all previously recorded information from Record Prints onto the electronic files.
 2. Make all final changes and corrections to the electronic files for the Final Record Drawings.
 3. Signatures Required: The Construction Manager and Sub-Contractor shall sign each drawing for which they are responsible, as certification that the work was installed as shown.
 4. Deliver signed, completed Final Record Drawings to Architect.
- C. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Owner's Project Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file with comment function enabled.
 2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 3. Refer instances of uncertainty to Architect for resolution.
 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- D. Format: Identify and date each Record Drawing; include the designation "**PROJECT RECORD DRAWING**" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.

2. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "**PROJECT RECORD DRAWINGS.**"
 - d. Name of Architect.
 - e. Name of Construction Manager.

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 substitutions and product options selected.
 3. Record the name of the 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 Drawings, and Product Data where applicable.
 6. Format: Submit record Specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA:

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Drawings, and Product Data where applicable.
 4. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.
 5. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS:

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.
 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE:

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and 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 and Owner's Project Manager's reference during normal working hours.

END OF SECTION 017839

SECTION 017900

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Division 01 Section "Project Management and Coordination" for requirements for preinstruction conferences.

1.3 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. At completion of training, submit one complete training manual for Owner's use.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 QUALITY ASSURANCE:

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION:

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM:

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 - 1. Equipment, including stage equipment, projection screens, loading dock equipment and laboratory fume hoods.
 - 2. Fire-protection systems, including fire alarm and fire-extinguishing systems.
 - 3. Intrusion detection systems.
 - 4. Laboratory equipment, including laboratory gas, equipment and piping.
 - 5. Heat generation, including boilers, feedwater equipment, pumps and water distribution piping.
 - 6. Refrigeration systems, including condensers, pumps and distribution piping.
 - 7. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
 - 8. HVAC instrumentation and controls.
 - 9. Electrical service and distribution, including transformers, switchboards, panelboards and motor controls.
 - 10. Lighting equipment and controls.
 - 11. Communication systems, including intercommunication, surveillance, clocks and programming equipment.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.

- c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
2. Documentation: Review the following items in detail:
- a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
- a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
- a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
- a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
- a. Diagnostic instructions.
 - b. Test and inspection procedures.

7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.

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

PART 3 - EXECUTION

3.1 PREPARATION:

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

3.2 INSTRUCTION:

- A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- B. 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.
- C. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- D. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 024199SELECTIVE DEMOLITIONPART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Demolition and removal of selected elements.
 - 2. Salvage of existing items to be reused or recycled.
- B. Related Sections include the following:
 - 1. Division 01 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS:

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

1.4 MATERIALS OWNERSHIP:

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during selective demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

1.5 SUBMITTALS:

- A. Qualification Data: For demolition firm, professional engineer, and refrigerant recovery technician.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.

- C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

1.6 QUALITY ASSURANCE:

- A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
- E. Predemolition Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.7 PROJECT CONDITIONS:

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
 - 1. Comply with requirements specified in Division 1 Section "Summary."
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous materials will be removed by Owner under a separate contract.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Construction Manager.
 - 3. Construction Manager will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.

- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY:

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS:

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 1 Section "Summary."

3.3 PREPARATION:

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Division 1 Section "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 1 Section "Temporary Facilities and Controls."

- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

- 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL:

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

- 1. Dispose of demolished items and materials promptly.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS:

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

3.6 DISPOSAL OF DEMOLISHED MATERIALS:

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING:

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

END OF SECTION 024199

SECTION 030130

MAINTENANCE OF CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior concrete slab sealer where no floor finish is scheduled.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers and manufacturers.
- B. Product Test Reports: For each sealer, for tests performed by manufacturer and witnessed by a qualified testing agency.
- C. Maintenance Program: Submit before work begins.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Each sealer manufacturer shall employ factory-trained technical representatives who are available for consultation and Project-site inspection and assistance at no additional cost.
- B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer to apply sealers.
- C. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Sealer: Apply an approximately 50 sq. ft. (4.6 sq. m) area of sealer.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.

1.8 FIELD CONDITIONS

- A. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. Do not apply to wet substrates unless approved by manufacturer.
- B. Environmental Limitations for Sealers: Do not apply when concrete surface temperature is below 55 deg F (13 deg C) or above . Apply only to dry substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain each color, grade, finish, type, and variety of product from single source with resources to provide products of consistent quality in appearance and physical properties.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.

2.2 SLAB SEALERS

- A. Sealer (**CS-1**): A penetrating sealer and crack filler recommended by manufacturer for penetrating and sealing cracks in concrete; VOC content 100 g/L or less.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ChemMasters; Chemisil Plus.
 - b. ChemTec Int'l; ChemTec One.
 - c. Conspec by Dayton Superior; Intraseal.
 - d. Curecrete Distribution Inc.; Ashford Formula.
 - e. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - f. Edoco by Dayton Superior; Titan Hard.
 - g. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
 - h. Kaufman Products, Inc.; SureHard.
 - i. L&M Construction Chemicals, Inc.; Seal Hard.
 - j. Meadows, W. R., Inc.; LIQUI-HARD.
 - k. Metalcrete Industries; Floorsaver.
 - l. Nox-Crete Products Group; Duro-Nox.
 - m. Symons by Dayton Superior; Buff Hard.
 - n. US SPEC, Division of US Mix Products Company; US SPEC Industraseal.
 - o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS Clear.

2.3 MIXES

- A. General: Mix products, in clean containers, according to manufacturer's written instructions.
 - 1. Do not add water, thinners, or additives unless recommended by manufacturer.
 - 2. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
 - 3. Do not mix more materials than can be used within time limits recommended by manufacturer. Discard materials that have begun to set.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect persons, motor vehicles, building site, plants, and surrounding buildings from harm resulting from concrete maintenance work.
 - 1. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
 - 2. Use only proven protection methods appropriate to each area and surface being protected.
 - 3. Provide barricades, barriers, and temporary directional signage to exclude public from areas where concrete maintenance work is being performed.
 - 4. Protect adjacent surfaces and equipment by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
 - 5. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
 - 6. Dispose of debris and runoff from operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
- B. Surface Preparation for Sealers: Clean concrete to remove dirt, oils, films, and other materials detrimental to sealer application.
 - 1. Use low-pressure water cleaning or detergent scrubbing.

3.2 APPLICATION

- A. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.
- B. Sealer: Apply by brush, roller, or airless spray at manufacturer's recommended application.
- C. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; re-wet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry.

END OF SECTION 030130

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Moisture Vapor Reducing Admixture (MVRA) for new concrete slabs on grade, at Main building and Concession building.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.
 - 2. Section 033000 - Cast-in-place Concrete.
 - 3. Section 072600 - Vapor Retarders: Underslab vapor retarder.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of following:
 - 1. Blended hydraulic cement.
 - 2. Fly ash and other pozzolans.
 - 3. Ground granulated blast-furnace slag.
 - 4. Silica fume.

1.3 REFERENCES

- A. American Concrete Institute (ACI)(www.concrete.org):
 - 1. 302.2R-06 - Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring.
 - 2. 305R-10 - Guide to Hot Weather Concreting.
 - 3. 306R-10 - Guide to Cold Weather Concreting.
- B. ASTM International (ASTM)(www.astm.com):
 - 1. C494/C494M: Standard Specification for Chemical Admixtures for Concrete.
 - 2. D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.
 - 3. E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
 - 4. E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.
 - 5. F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
- C. National Ready Mix Concrete Association (NRMCA)(www.nrmca.org) - Certification of Ready Mixed Concrete Production Facilities.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Product Data: Manufacturer's descriptive data for admixture.
 - 2. Warranties:
 - a. Sample lifetime warranty against flooring/coating failure due to concrete moisture vapor emission (MVE).
 - b. Sample adhesion warranty.

- B. Quality Control Submittals:
 1. Certificate of Compliance: Manufacturer's statement certifying admixture provided meets or exceeds specified requirements.
 2. Test Reports: Test results performed by qualified independent testing agency evidencing compliance of products with specified requirements of moisture vapor transmission based on ASTM D5084.
- C. Sustainable Design Submittals:
 1. Regional Materials.
 2. Low-Emitting Materials.
 3. Health Product Declaration (HPD). Readily available and published on the HPD Public Repository developed by the HPD Collaborative (HPDC).

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 1. Firm experienced in manufacture of concrete MVRA.
 2. Capable of providing test reports indicating compliance with specified performance requirements and with ASTM C494/C494M testing protocols, from independent AASHTO approved laboratory.
 3. Able to provide on-site technical assistance if requested.
- B. Pre-Installation Conference:
 1. Convene at Project site minimum 2 weeks prior to beginning work of this Section.
 2. Attendance: Architect, Contractor, Construction Manager, Testing Laboratory, MVRA manufacturer, and concrete supplier, either in person or via teleconference.
 3. Review and discuss:
 - a. MVRA project specific quality control procedures.
 - b. Concrete mix designs.
 - c. Procedures for ensuring quality of concrete materials.
 - d. Testing laboratory responsible for concrete design mixtures, sampling and testing.
- C. Ready Mixed Concrete Manufacturer Qualifications:
 1. Firm experienced in manufacturing ready-mixed concrete products.
 2. Comply with ASTM C94/C94M requirements for production facilities and equipment.
 3. Manufacturer certified per NRMCA certification procedures.
- D. Slab Moisture Testing and Evaluation:
 1. Personnel performing laboratory tests: Certified in conduct of ASTM D5084 under supervision of licensed geotechnical engineer.
 2. Determination of whether concrete slab is prepared to receive flooring, coatings, or roofing rests with MVRA manufacturer.
- E. Obtain concrete moisture vapor reducing admixtures from same manufacturer.
- F. Slabs to Receive Moisture Sensitive Coatings or Material: Comply with ACI 302.2R-06.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store products in temperature controlled area above 40 degrees, protected from exposure to harmful weather conditions
- B. Do not allow products to freeze.

1.7 WARRANTIES

- A. Provide manufacturer's lifetime warranty against concrete induced moisture vapor failure, providing coverage for:
 1. Repair or removal of failed flooring.
 2. Placement of topical moisture remediation system.

3. Replacement of flooring materials to match original including material and labor.
- B. Provide manufacturer's adhesion warranty, matching terms of adhesive or primer manufacturer's material adhesion warranty.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Concrete Moisture Vapor Reduction Admixture (MVRA):
1. Non-toxic, volatile organic compound (VOC) free, liquid admixture formulated to react with hydroxide ions produced by cement hydration process, creating additional hydration products within capillary pores, blocking moisture vapor movement through concrete.
 2. Physical characteristics:
 - a. Hydraulic conductivity: Project specific maximum of 6.0 E-8 cm/s per ASTM D5084.
 - b. Toxicity: None.
 - c. Odor: None.
 - d. Flammability: None.
 - e. Volatile Organic Compound (VOC) content: 0 grams per liter.
 - f. Freeze temperature: 32 degrees F (0 degrees C).
 - g. pH: 11.3.

2.2 ACCEPTABLE PRODUCTS AND MANUFACTURERS:

- A. Basis of design: MVRA 900 by ISE Logik Industries; Dean E. Craft, P: 585.474.3553, decraft@iselogik.com, www.iselogik.com
- B. Other acceptable products.
1. Barrier One Moisture Vapor Reduction Admixture by Barrier One, Inc.; P: 877.224.5850, info@barrierone.com; <http://barrierone.com/>
 2. Concure Systems Admixture by Concure Systems; P: 480.820.7171; <http://www.concuresystems.com/admixture>;
 3. Vapor Lock 20/20 by SPG Specialty Products Group; P: 877.957.4626; <http://www.spqqogreen.com/>
- C. Submitted product must evidence compliance with:
- a. Lifetime warranty as described in paragraph 1.7
 - b. Stand-alone adhesion warranty as described in paragraph 1.7
 - c. Independently published Health Product Declaration (HPD)
- D. Substitution Limitations: See Section 016000 – PRODUCT REQUIREMENTS

2.3 ACCESSORIES

- A. Sheet Vapor Retarder: Specified in Section 072600.

2.4 MIXES

- A. Add MVRA to concrete mix in accordance with manufacturer's instructions.
- B. Add MVRA at a dosage rate per 100 pounds (355ml/45kg) of total cementitious materials as required by the MVRA manufacturer.
- C. Replace mix water on one-for-one basis in amount equal to amount of MVRA added.

- D. Add MRVA directly to freshly mixed concrete at end of the batch process with tail water.
- E. Ready-Mixed Concrete:
 - 1. Measure, batch, mix, and deliver concrete with MVRA in accordance with ASTM C94/C94M.
 - 2. Furnish batch ticket information showing dosage of MVRA.
- F. Site Mixing:
 - 1. Measure, batch, and mix concrete materials and concrete in accordance with ASTM C94/C94M.
 - 2. Add MVRA to where it makes direct contact with ready mix, then rotate drum of batch truck on high for at least seven minutes prior to discharge.
- G. Freshening onsite with held back mix water is acceptable if in accordance with ACI guidelines and if amount does not exceed original water to cementitious material ratio or instructions of [Architect.] [Design/Builder.] [Structural Engineer.]
- H. Use water reducing admixtures to achieve desired slump.
- I. Use of other admixtures in same batch as MVRA is acceptable if each admixture is added separately.
- J. Do not use shrink reducing admixtures.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Comply with requirements of Section 033000 for concrete mixing, placing, and curing.
- B. Protect and repair sheet vapor retarder in accordance with to ASTM E1643, ASTM F710, ACI 302.2R-06, and manufacturer's instructions.
- C. Cold Weather Placement: Comply with ACI 306R-10.
- D. Hot Weather Placement: Comply with ACI 305R-10.

3.2 CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306R-10 for cold-weather protection and ACI 305R-10 for hot-weather protection during curing.
- B. Cure concrete slabs to receive moisture sensitive coatings per ACI 302.2R-06 by one or more of the following methods:
 - 1. Moisture-retaining cover curing.
 - 2. Self-dissipating curing compound.

3.3 FIELD QUALITY CONTROL

- A. Project specific quality control process shall consist of the concrete moisture vapor reduction admixture representative procuring one random cylinder from every project containing the concrete moisture vapor reduction admixture. The cylinder shall be sent to an independent laboratory for hydraulic conductivity (coefficient of permeability) per ASTM D5084. The results of this "project specific" quality control protocol shall form the basis for the issuance of the project specific warranty.
 - 1. Should the Quality Control Protocol deliver results more than 6.0 E-08 cm/sec, the concrete moisture vapor reduction admixture manufacturer shall be permitted to core the project slab to test the in-place concrete per ASTM D5084.
 - 2. If the core delivers results less than 6.0 E-08 cm/sec, no further action is required
 - 3. If the core delivers results more than 6.0 E-08 cm/sec, the concrete moisture vapor admixture manufacturer shall provide, at their expense, a warranted topical moisture mitigation system or

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product for all areas not meeting the stated limit; including concrete slab preparation, material, and installation.

- B. Ready Mix Producer: Provide batch tickets indicating presence and dosage of MVRA in mix.

END OF SECTION

SECTION 031000

CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes formwork for cast-in-place concrete, including water stops, and installation of embedded items.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement - Section 03 20 00
- B. Cast-In-Place Concrete - Section 03 30 00
- C. Under-Slab Vapor Retarder – Section 07 26 00

1.3 QUALITY ASSURANCE

- A. Comply with the American Concrete Institute Standard, ACI 347-04, Recommended Practice for Concrete Formwork.

1.4 REFERENCE STANDARDS, latest editions of the following:

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM D 226 Specification for Asphalt - Saturated Organic Felt used in Roofing and Waterproofing"
 - 2. ASTM D 1751 Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood complying with Voluntary Product Standard PS 1-07 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better or metal, metal-framed plywood or other acceptable panel-type materials. Plywood shall be mill-oiled and edge-sealed, with each piece bearing legible inspection trademark. Furnish in largest practicable sizes to minimize number of joints. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.
- B. Forms for Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least 2 edges and one side for tight fit.

- C. Form Coatings: Commercial formulation that will not bond with, stain, or adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
 - D. Chamfer Strips: $\frac{3}{4}$ inch by $\frac{3}{4}$ inch wood, PVC, or rubber.
 - E. Preformed Construction Joint: 24-gage steel, galvanized, shaped to form a continuous tongue and groove key.
 - F. Preformed Control Joint: Rigid plastic or metal strip with removable top section.
 - G. Expansion Joint Material: Asphalt saturated fiberboard, $\frac{1}{2}$ inch thick, meeting the requirements of ASTM D 1751.
 - H. Felt: Asphalt-saturated organic felt, weighing 30 pounds per 100 square feet, meeting the requirements of ASTM D 226.
 - I. Water stops: PVC, meeting the requirements of CRD-C572. Provide 6 inches wide dumbbell shape water stop with $\frac{3}{16}$ -inch minimum web thickness and $\frac{3}{8}$ inch minimum end bulb diameter.
- OR
- J. Water stops: Volclay RX manufactured by Colloid Environmental Technologies Co. (CETCO).
 - K. Recycled Content: Minimum 5 percent post-consumer content, or minimum 20 percent pre-consumer recycled content at contractor's option.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

- A. Form Coating: Coat contact surfaces of forms with a form coating compound before reinforcement is placed. Thin form-coating compounds with thinning agent and apply as specified in manufacturer's instructions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed.

3.3 INSTALLATION

- A. Formwork: Formwork shall support vertical and lateral loads that are applied until such loads can be supported by concrete structure. Formwork shall be readily removable without impact,

shock or damage to cast-in-place concrete surfaces and adjacent materials. Construct forms to sizes, shapes, lines and dimensions shown. Perform surveys to obtain accurate alignment. Provide for recesses, chamfers, blocking, anchorages, inserts, and other features required in work. Select materials to obtain required finishes. Butt joints solidly and provide backup at joints to prevent leakage of cement paste.

- B. Chamfer Strips: Provide at exposed corners and edges.
- C. Form Ties: Use factory fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal.
- D. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris before concrete is placed. Retighten forms and bracing after concrete placement as required to eliminate mortar leaks and maintain proper alignment.

3.4 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set anchorage devices and other embedded items accurately. Use setting drawings, diagrams, templates and printed instructions provided by supplier. Secure embedded items such that they are not displaced during placement of concrete.
- B. Water stops: Install according to manufacturers printed instructions. Splice water stop sections using square cut butt joints and fuse sections together with indirect heat from preheated splicing iron. Use of direct flame is prohibited.
 - 1. Place water stops in all concrete construction joints in basement walls around the building perimeter that are exposed to soil, weather, or moisture, and in any other construction joints that have the potential to allow water infiltration into the building.

3.5 JOINTS

- A. Construction Joints in Elevated Slabs and Beams: Construction joints in Elevated Slabs, Beams, Grade Beams, and other flexural members shall only be made as shown in the contract drawings or as approved by the Engineer of Record. Joints shall be constructed in accordance with ACI 318 Section 6.4 with provisions made for the transfer of shear and other forces. Reinforcement shall be continuous through these joints unless noted otherwise.
- B. Construction Joints in Walls, Foundations, and Slabs on Grade: Provide keyways at least 1 ½ inches deep in vertical construction joints in walls and construction joints in slabs on grade and foundations. Discontinue every other horizontal bar through slab on grade construction joints unless noted otherwise.
- C. Preformed Construction Joint for Slabs on Grade: Secure with galvanized steel stakes, 1/8 inch thick by 1-1/8 inches wide with ½ inch deep rib and tapered point. Splice adjoining joints with 24 gage steel, galvanized splice plates.
- D. Isolation Joints in Slabs on Grade: Construct isolation joints in interior slabs using 30 lb. felt. Provide isolation joints at points of contact between slabs on grade and vertical surfaces, such as column pedestals, foundation walls, grade beams and elsewhere as indicated. Construct

isolation joints on exterior slabs abutting vertical surfaces with ½ inch thick expansion joint material.

E. Control Joints in Slabs-on-Grade:

1. Preformed Strip: Insert premolded rigid plastic, or metal strip into fresh concrete. Cut groove for strip using 10-foot long straight edge cutting tool. Depths of strip shall be one fourth of slab thickness. Press strip into groove such that top of strip is level with the concrete surface. Pull off removable top section, if any, prior to troweling.
2. Saw Cut: Contractor may saw cut control joints instead of using preformed strips. Saw cut joints shall be 1/8 inch wide. Saw cut depth should equal 1/4 of slab depth. Cut joints after concrete has hardened sufficiently to prevent raveling; usually 4 to 12 hours after slab has been cast and finished. Use diamond or silicone-carbide blades.

F. Control Joints in Walls: Create weakened planes in cantilevered retaining walls at 25 feet on center. Use preformed strips, placed vertically, full height in each face of wall. Depth of strips shall be one inch.

3.6 REMOVAL OF FORMWORK

- A. General: Prevent excessive deflection, distortion, and damage to concrete when forms are stripped. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- B. Formwork and supports at sides of concrete shall remain in place for 24 hours after concrete placement. This period represents cumulative number of hours, not necessarily consecutive, during which the temperature of the air surrounding the concrete is above 50 degrees F. Formwork and shoring which support the weight of concrete shall not be removed until concrete has attained its specified compressive strength.
- C. Ensure safety of the structure. Do not superimpose any load on concrete until forms are removed and concrete is cured.

3.7 RE-USE OF FORMS

- A. General: Clean and repair surfaces of forms to be re-used in work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable for exposed surfaces. Apply new form coating compound as specified for new formwork.

When forms are intended for successive concrete placement, thoroughly clean surfaces and remove fins and latence. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces.

END OF SECTION 031000

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes fabrication and installation of deformed bar and welded wire fabric reinforcing steel.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories - Section 03 10 00.
- B. Cast In Place Concrete - Section 03 30 00.

1.3 QUALITY ASSURANCE

- A. Reference Standards:

- 1. American Concrete Institute (ACI)
 - a. ACI 301-05 Specifications for Structural Concrete for Buildings
 - b. ACI 315-99 Details and Detailing of Concrete Reinforcement
 - c. ACI 318-05 Building Code Requirements for Structural Concrete
- 2. American Society for Testing and Materials (ASTM)
 - a. ASTM A 82/
A82M-07 Standard Specification for Steel Wire, plain, for Concrete Reinforcement
 - b. ASTM A 185/
A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
 - c. ASTM A 615/
A 615M-09b Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- 3. Concrete Reinforcing Steel Institute (CRSI). Design Handbook - 2002 Edition

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for reinforcing steel. Comply with ACI 315 requirements showing layout, bar schedules, stirrup spacing, diagrams of bent bars, and arrangement of reinforcing steel. Shop Drawings shall not be made by reproduction of the Contract Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60. Stirrups and ties may be Grade 40.
- B. Welded Wire Fabric: ASTM A 185, flat sheets.
- C. Steel Wire: ASTM A 82, 16 gage.
- D. Supports for Reinforcing Steel: Wire bar type and precast concrete block type meeting the requirements of CRSI Manual of Standard Practice.

2.2 FABRICATION

- A. Fabricate reinforcing steel in accordance with fabricating tolerances in ACI 315.
- B. Do not fabricate reinforcing steel until shop drawings are approved.

PART 3 - EXECUTION

3.1 PLACING BAR SUPPORTS

- A. General: Provide bar supports meeting the requirements of CRSI Specification for Placing Bar Supports.
- B. Slabs-on-grade: Use supports with sand plates or precast concrete blocks or horizontal runners where base material will not support chair legs.

3.2 PLACING REINFORCING STEEL

- A. General: Comply with CRSI Code of Standard Practice for "Placing Reinforcing Bars".
- B. Clean reinforcing steel of loose rust and mill scale, earth, ice, and other materials, which reduce or destroy bond with concrete.
- C. Accurately position, support and secure reinforcing steel against displacement by formwork, construction, or concrete placement operations. Place reinforcing steel to obtain minimum coverages. Arrange, space and securely tie bars and bar supports to hold reinforcing steel in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

Concrete Cover:

Concrete cast against and permanently exposed to earth 3 inches

Concrete exposed to earth or weather:

Bars larger than No. 5

2 inches

Bars No. 5 or smaller.

1 ½ inches

- D. Rebar Splices: Locate at points of minimum stress or as shown on contract drawings. Unless noted otherwise, provide lap splices 30 bar diameters (18 inches minimum) in length.
- E. Welded Wire Fabric Splices: Lap one complete wire spacing.
- F. Corner Reinforcing: Provide corner bars of same size and spacing as horizontal reinforcing steel. Lap with horizontal reinforcing 30 bar diameters or 18 inches minimum length.
- G. Reinforcing at Construction/Control Joints: Continue reinforcing steel through construction joints unless noted otherwise. Discontinue reinforcing steel 2 inches from preformed construction joints in slabs-on-grade. Cut alternate longitudinal bars at weakened plane control joints in walls.

END OF SECTION 032000

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section covers cast-in-place concrete including finishing, surface repair and curing.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Forming and Accessories - Section 03 10 00
- B. Concrete Reinforcement - Section 03 20 00
- C. Under Slab Vapor Retarder – Section 07 26 00

1.3 QUALITY ASSURANCE

- A. Reference Standards: Meet the requirements of the following codes, specifications and standards, latest versions of the following:

- 1. American Concrete Institute (ACI) Publications;
 - a. ACI 301 Specifications for Structural Concrete for Buildings
 - b. ACI 306.1 Standard Specification for Cold Weather Concreting
 - c. ACI 318 Building Code Requirements for Structural Concrete.
- 2. ASTM International (ASTM);
 - a. ASTM C 31/ C31M Standard Practice for Making and Curing Concrete Test Specimens in the Field
 - b. ASTM C 33/ C33M Standard Specification for Concrete Aggregates
 - c. ASTM C 39/ C39M Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
 - d. ASTM C 94/ C 94M Standard Specification for Ready-Mixed Concrete
 - e. ASTM C 131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by

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| | | Abrasion and Impact in the Los Angeles Machine |
| f. | ASTM C 136 | Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates |
| g. | ASTM C 143 C 143M | Standard Test Method for Slump of Hydraulic Cement Concrete |
| h. | ASTM C 150/ C150M | Standard Specification for Portland Cement |
| i. | ASTM C 171 | Standard Specification for Sheet Materials for Curing Concrete |
| j. | ASTM C 172/ C172M | Standard Practice for Sampling Freshly Mixed Concrete |
| k. | ASTM C 173/ C 173M | Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method |
| l. | ASTM C 231/ C231M | Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method |
| m. | ASTM C 260/ C260M | Standard Specification for Air Entraining Admixtures for Concrete |
| n. | ASTM C 309 | Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete |
| o. | ASTM C 330/ 330M | Standard Specification for Lightweight Aggregates for Structural Concrete |
| p. | ASTM C 494/ C 494M | Standard Specification for Chemical Admixtures for Concrete |
| q. | ASTM C 567 | Standard Test Method for Determining Density of Structural Lightweight Concrete |
| r. | ASTM C 618 | Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete |
| s. | ASTM D 4318 | Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils |

- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
 - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and admixtures.
- B. Concrete Mix Design:
 - 1. Submit mix design in accordance with ACI-301, Section 4.
 - 2. Submit with mix design results of laboratory tests performed within previous 12 months indicating aggregates from the proposed source comply with the requirements of ASTM C 33 or C 330 as applicable.
 - 3. Submit the proposed area of use for each mix design submitted (footings, stemwalls, slabs, walls, columns, etc.).
- C. Granular Base Course: Submit gradation, plasticity index, and wear information.
- D. Test Reports: Submit copies of test reports for concrete compressive strength, air content, temperature and slump. Submit copies of granular base course test reports.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Environmental Requirements: Manufacturer and Contractor shall conform to Federal, State, and Local V.O.C. (Volatile Organic Compound) Regulations in area where Project is located. Notify A/E in writing if variations to Specifications herein are required.
 - 1. V.O.C. content shall be a maximum 250 (55) gm/liter, unless more stringent codes or laws apply.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, low alkali. Use one brand of cement throughout project.

- B. Normal Weight Aggregates: ASTM C 33. Provide aggregates from a single source for exposed concrete.
- C. Lightweight Aggregates: ASTM C330. Provide aggregates from single source for each class of concrete.
- D. Water: Potable.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Water Reducing Admixture: ASTM C 494.
- G. Fly-Ash: ASTM C 618, Class C
- H. Moisture-Retaining Cover: Provide waterproof paper, polyethylene film, or polyethylene-coated burlap meeting the requirements of ASTM C 171.
- I. Liquid Membrane-Forming Curing Compound: Liquid type membrane-forming curing compound meeting the requirements of ASTM C 309; Type 1-D with fugitive dye for interior concrete and foundations; Type 2, white pigmented, for exposed exterior concrete except exposed exterior Architectural concrete, use Type 1-D.

Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs. Curing compound to be used on integrally colored concrete slabs shall be approved by the manufacturer of the color.

- J. Vapor Retarder shall comply with Section 07 26 00 of these Specifications.
- K. Granular base shall meet the following grading requirements when tested in accordance with ASTM C 136.

Granular base shall meet the gradation and material properties requirements as listed in the General Structural Notes.

The plasticity Index shall be no greater than 3 when tested in accordance with ASTM D 4318. The coarse aggregate shall have a percent wear of 50 or less when tested in accordance with ASTM C 131.

2.2 PROPORTIONING AND DESIGN OF MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial mixture or field experience methods as specified in ACI 301, Section 4. If trial mixture method is used, employ an independent testing facility, acceptable to Architect, for preparing and reporting proposed mix designs.
- B. Submit written reports to Architect, or Engineer, of each proposed mix for each class of concrete at least 15 days prior to start of work. Do not begin concrete production until mixes have been approved.

- C. Structural lightweight concrete shall have a measured equilibrium density not exceeding 115 pounds per cubic foot when tested in accordance with ASTM C 567.
- D. Refer to the General Structural Notes for concrete strengths.
- E. Slabs-on-ground or on vapor retarder shall have a water/total cementitious ratio not to exceed 0.45.
- F. Admixtures
 - 1. Structural lightweight concrete may have an entrained air content up to a maximum of 10 percent.
 - 2. Use water reducing admixture conforming to ASTM C 494, Type A, in all concrete unless approved otherwise by the Structural Engineer.
 - 3. All other admixtures shall have the written approval of the Architect or Structural Engineer.
 - 4. Calcium chloride is not permitted.
 - 5. All admixtures, except high range water reducers, shall be added to the concrete at the batch plant.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel. Set screeds accurately. Embedded items shall be accurately aligned and adequately supported. Verify installation of mechanical, plumbing, and electrical items to be embedded in concrete. Correct any unsatisfactory condition before proceeding further.

3.2 PREPARATION

- A. Before placing concrete, clean and roughen surface of previously placed concrete. Clean reinforcing steel. Remove debris, providing clean-outs at bottom of forms when necessary. Moisten surfaces to receive concrete unless otherwise prepared. Remove excess water before placing concrete.

3.3 CONCRETE PLACEMENT

- A. General: Comply with ACI 301.
- B. Place concrete continuously in layers not deeper than 24 inches. Concrete shall not be placed against concrete which has hardened sufficiently to cause the formation of seams or planes of

weakness. If a section cannot be placed continuously, provide construction joints. Deposit concrete as nearly as practicable to its final location to avoid segregation. Do not use vibrators to transport concrete.

- C. Maintain reinforcing in proper position during concrete placement operations.
- D. Consolidate concrete, immediately after placing, by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI recommended practices.
- E. Bring slab surfaces to correct level with straightedge and strikeoff. Use bull floats or darbies to smooth surface. Do not disturb slab surfaces prior to beginning finishing operations.
- F. Cold Weather Concreting: Protect concrete work from physical damage or reduced strength caused by frost, freezing or low temperatures. Comply with ACI 306.1.
- G. Hot Weather Concreting: When hot weather conditions exist that would impair quality and strength of concrete, reduce delivery time of ready mix concrete, lower the temperature of materials, or add retarder to ensure that the concrete is plastic. Retempering with water is not allowed. Comply with ACI 305R.

3.4 FINISH OF FORMED SURFACES

- A. Rough Form Finish: Provide where formed concrete surfaces are not exposed to view. Tie holes and surface imperfections shall be repaired and patched and fins and other projections exceeding ¼ inch in height rubbed down or chipped off.

3.5 FINISH OF HORIZONTAL SURFACES

- A. At tops of foundation walls and grade beams finish with a texture matching adjacent formed surfaces unless otherwise indicated.

3.6 SLAB FINISHES

- A. Float Finish: Begin floating when surface water has disappeared and when concrete has stiffened sufficiently to permit operation of power-driven or hand floats. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance not exceeding ¼ inch in 10 feet when tested with a 10 foot straightedge.
- B. Scratch Finish: Apply scratch finish to slab surfaces that are to receive floor topping. Roughen surface before final set, using stiff brushes, or brooms.
- C. Trowel Finish: Apply trowel finish to all slab surfaces unless noted otherwise. After floating, begin first trowel finish using a power-driven or hand trowel. Finish concrete surface by a final hand-trowel operation, free of trowel marks, and uniform in texture and appearance. The final surface finish for slabs-on-grade shall have a minimum FF = 25 and a minimum FL = 20 per ACI requirements. The final surface finish for elevated slabs shall have a minimum FF = 25.

- D. Broom Finish: Apply on exterior slabs, ramps, steps, and sidewalks. Immediately after concrete has received a float finish, draw a broom or burlap belt across the surface to give a coarse transverse scored texture.

3.7 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Continue curing for at least 7 days.
- B. Moisture-retaining Cover curing: All interior concrete slabs, except exposed integrally colored concrete slabs, are to be cured with a moisture retaining cover for the first 7 days. After that time, the cover shall be removed and the slab should be allowed to dry. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed. Repair any holes or tears in cover during curing period.
- C. Curing compound: At contractor's option, exterior concrete slabs may be cured using curing compound. All vertical concrete (walls, beams, etc...) shall be cured using curing compound – apply compound to the vertical surface as soon as the forms are removed. Apply curing compound uniformly in accordance with the manufacturer's printed instructions. Curing compound shall NOT be used on interior slabs, except exposed integrally colored concrete slabs.
- D. Exposed integrally colored concrete slabs: Use curing compound recommended by the concrete supplier. Apply with and airless sprayer.

3.8 CONCRETE SURFACE REPAIRS

- A. Patching Surface Imperfections: Remove loose material and patch surface imperfections and holes left by tie rods with cement mortar. Surface imperfections include honeycomb, excessive air voids, sand streaking and cracks.

3.9 FOR EXPOSED-TO-VIEW SURFACES

- A. Blend white portland cement and standard portland cement so that, when dry, patching mortar will match color surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Sampling Fresh Concrete: ASTM C 172.
- C. Slump: ASTM C 143; one test for each set of compressive strength test specimens.
- D. Air Content: ASTM C 173 or C 231 for each set of compressive strength test specimens.

- E. Concrete Temperature: Test hourly when air temperature is 40 degrees F. and below, when 80 degrees F and above; and when compression test specimens are made.

- F. Compression Test Specimen: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field cure test specimens are required. Mold one set of standard cylinders for volume of concrete specified below or fraction thereof.
 - 1. Slabs on Grade or Metal Deck 30 cubic yards
 - 2. Footings and stem walls 50 cubic yards
 - 3. All other locations (unless noted otherwise) 30 cubic yards

- G. Compressive Strength Tests: ASTM C 39; test 1 specimen at 7 days, 2 specimens at 28 days, and retain one specimen in reserve for later testing. Additional Tests: The testing laboratory will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure as directed by the Architect. The testing laboratory may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Architect or Engineer. The Owner shall pay for such tests conducted, and any other additional testing as may be required, when unacceptable concrete is verified.

- H. Granular Base Course: ASTM C 136 and ASTM D 4318 for every 500 square yards of building slab area.

END OF SECTION 033000

SECTION 033300

ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes cast-in-place architectural concrete, including form facings, reinforcement and accessories, concrete materials, concrete mixture design, placement procedures, and finishes.
 - 1. Requirements in Section 033000 "Cast-in-Place Concrete" apply to architectural concrete.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete not designated as architectural concrete.

1.3 DEFINITIONS

- A. Cast-in-Place Architectural Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.
- C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.
- E. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place architectural concrete Subcontractor.
 - 2. Review concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction joints, reinforcement accessory installation, and protection of cast-in-place architectural concrete.
 - 3. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
 - 2. Product Certificates: For regional materials, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each regional material.
- C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- D. Formwork Shop Drawings: Show formwork construction, including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.
- E. Placement Schedule: Submit concrete placement schedule before start of placement operations. Include locations of all joints, including construction joints.
- F. Samples: For each of the following materials:
 - 1. Form-facing panels.
 - 2. Form ties.
 - 3. Form liners.

4. Exposed aggregates.
5. Coarse- and fine-aggregate gradations.
6. Chamfers and rustications.

G. Samples for Verification: Architectural concrete Samples, cast vertically, approximately 18 by 18 by 2 inches (450 by 450 by 50 mm), of finishes, colors, and textures to match design reference sample. Include Sample sets showing the full range of variations expected in these characteristics.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

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

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Repair materials.

C. Material Test Reports: For the following, by a qualified testing agency:

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

1.7 QUALITY ASSURANCE

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

1. Manufacturer certified according to NRMCA's "NRMCA Quality Control Manual - Section 3, Certification of Ready Mixed Concrete Production Facilities."

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

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

- C. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches (1200 by 1200 by 150 mm) minimum, to demonstrate the expected range of finish, color, and texture variations.
1. Locate panels as indicated or, if not indicated, as directed by Architect.
 2. Demonstrate methods of curing, aggregate exposure, sealers, and coatings, as applicable.
 3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
 4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 5. Demolish and remove field sample panels when directed.
- D. Mockups: Before casting architectural concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Build mockups of typical exterior wall of cast-in-place architectural concrete as shown on Drawings.
 3. Demonstrate curing, cleaning, and protecting of cast-in-place architectural concrete, finishes, and contraction joints, as applicable.
 4. In presence of Architect, damage part of the exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
 5. Obtain Architect's approval of mockups before casting architectural concrete.
 6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
 4. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.

- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301 (ACI 301M).
 2. ACI 303.1.

2.2 CONCRETE SURFACE-SEEDED AGGREGATE

- A. **ARC-[#]**: Refer to Section 090001 Schedule of Finishes for specified surface-seeded aggregate type, size, color, and distribution percentage.

2.3 FORM-FACING MATERIALS

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork and other form-facing material requirements.
- B. Source Limitations: Obtain each type form-facing material from single source from single manufacturer.
- C. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, 3/4 by 3/4 inch (19 by 19 mm), minimum; nonstaining; in longest practicable lengths.
- D. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800; minimum 1/4 inch (6 mm) thick.
- E. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.
- F. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

- G. Form-Release Agent: Commercially formulated, colorless form-release agent that will not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- H. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.

2.4 STEEL REINFORCEMENT AND ACCESSORIES

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for steel reinforcement and other requirements for reinforcement accessories.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufactured according to CRSI's "Manual of Standard Practice."

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type 1, white.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from single source with documented service-record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 1. Maximum Coarse-Aggregate Size: 3/8 inch (10 mm).
 - 2. Gradation: Uniformly graded.
- D. Normal-Weight Fine Aggregate: ASTM C 33/C 33M, manufactured or natural sand, from same source for entire Project.
- E. Air-Entraining Admixture: ASTM C 260/C 260M.

- F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that does not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- G. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, nonfading, and resistant to lime and other alkalis.
1. Color **ARC-[#]**: See Section 090001 - Schedule of Finishes.
- H. Water: Potable, complying with ASTM C 94/C 94M, except free of wash water from mixer washout operations.

2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
1. For integrally colored concrete, curing compound shall be approved by color pigment manufacturer.
 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

2.7 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

2.8 CONCRETE MIXTURES

- A. Obtain each color, size, type, and variety of concrete mixture from single manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.

- B. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301 (ACI 301M).
 - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
- C. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 (ACI 301M) requirements.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.
- G. Concrete Mixtures:
 - 1. Compressive Strength (28 Days): 4500 psi (31 MPa).
 - 2. Maximum W/C Ratio: 0.46.
 - 3. Slump Limit: 5 inches (127 mm), plus or minus 1/2 inch (12 mm).

2.9 CONCRETE MIXING

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

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork, embedded items, and shoring and reshoring.
- B. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.

- C. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- D. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- E. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- F. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- G. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
- H. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form-liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

3.2 REINFORCEMENT AND INSERT INSTALLATION

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
- B. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 REMOVING AND REUSING FORMS

- A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Schedule form removal to maintain surface appearance that matches approved field mockup.
 - 2. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
- B. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of 28-day design compressive strength. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- C. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.

- D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

3.4 JOINTS

- A. Construction Joints: Install construction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.] Align construction joint within rustications attached to form-facing material.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- B. Contraction Joints: Form weakened-plane contraction joints true to line, with faces perpendicular to surface plane of cast-in-place architectural concrete, so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.5 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

3.6 FINISHES, GENERAL

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 - 1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints unless otherwise indicated.

3.7 EXPOSED-AGGREGATE FINISHES

- A. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi (6.9 to 10.3 MPa), apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.
- B. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi (31 MPa). Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
 - 1. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in reveal projection to match design reference sample or mockup.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 (ACI 301M) for hot-weather protection during curing.
- B. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.

- c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

3.9 FIELD QUALITY CONTROL

- A. General: Comply with field quality-control requirements in Section 033000 "Cast-in-Place Concrete."

3.10 REPAIR, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
- D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- E. Wash and rinse surfaces according to concrete finish applicator's written instructions. Protect other Work from staining or damage due to cleaning operations.
 1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

END OF SECTION 033300

PART 1 - GENERAL1.1 WORK INCLUDED

- A. This section includes the construction of reinforced hollow core unit masonry, masonry veneer and special shapes. It includes all split face units and smooth face units, as well as masonry mortar and grout.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Concrete Reinforcement - Section 03 20 00
- B. Division 07 Section "Water Repellents" for water repellents applied to unit masonry assemblies.
- C. Division 07 Section "Sheet Metal Flashing and Trim" for exposed sheet metal flashing.
- D. Division 07 Section "Fire stopping" for fire stopping at tops of masonry walls and at openings in masonry walls.
- E. Division 08 Section "Louvers and Vents" for wall vents (brick vents).
- F. Products furnished, but not installed, under this Section include the following:
1. Anchor sections of adjustable masonry anchors for connecting to structural frame, installed under Division 05 Section "Structural Steel" and Division 13 Section "Metal Building Systems".
- G. Products installed, but not furnished, under this Section include the following:
1. Cast-stone trim, furnished under Division 04 Section "Cast Stone".
 2. Steel lintels for unit masonry, furnished under Division 05 Section "Metal Fabrications".
 3. Manufactured reglets in masonry joints for metal flashing, furnished under Division 07 Section "Sheet Metal Fabrications".
 4. Hollow-metal frames in unit masonry openings, furnished under Division 08 Section "Steel Doors and Frames".

1.3 QUALITY ASSURANCE

- A. Reference Standards. Latest edition of the following:
1. ASTM International (ASTM)

- a. ASTM A 615/
A615M Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- b. ASTM C 90 Standard Specification for Load bearing Concrete Masonry Units
- a. ASTM C 780 Standard Test Methods for Preconstruction and Construction Evaluation of Mortars for Plain and reinforced Masonry
- d. ASTM C 270 Standard Specification for Mortar for Unit Masonry
- e. ASTM C 476 Standard Specification for Grout for Masonry
- f. ASTM C 1019 Standard Test Method for Sampling and Testing Grout

2. American Concrete Institute (ACI)

- a. ACI 530.1 Specification for Masonry Structures

1.4 SUBMITTALS

- A. Product Data: Submit sample of exposed masonry unit of each color and texture to be used to complete the work. Submit copies of test reports performed within last 12 months for representative specimens to be used in accordance with ASTM C 140 for strength, absorption and moisture content, and ASTM C 426 for drying shrinkage.
- B. Test Reports: Submit copies of test reports for masonry units, mortar and grout.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units above ground on level platforms, which allows air circulation under stacked units.
- B. Cover and protect against wetting prior to use.
- C. Handle units on pallets or flat bed barrows.
- D. Store cementitious ingredients in weather-tight enclosures.
- E. Waste Management and Disposal: As specified in Division 01 Section “Construction Waste Management” and as follows:
 - 1. Separate and recycle waste materials in accordance with the Waste Management Plan and to the maximum extent economically feasible.
 - a. Fold up metal banding; flatten and place in designated area for recycling.

- b. Collect wood packing shims and pallets; place in designated area.
2. Recycling: Undamaged, excess masonry materials are Contractor's property and shall be removed from the Project site for his use.
3. Disposal as Fill Material: Dispose of clean masonry waste, including broken masonry units, waste mortar, and excess or soil contaminated sand, by crushing and mixing with fill material as fill is placed.
 - a. Crush masonry waste to less than 2 inches in greatest dimension.
 - b. Mix masonry waste with at least 2 parts specified fill material for each part masonry waste. Fill material is specified in Division 31 Section "Earth Moving".
 - c. Do not dispose of masonry waste as fill within 18 inches of finished grade.
4. Excess Masonry Waste: Remove excess, clean masonry waste that cannot be used as fill, as described above, and other masonry waste and legally dispose of off Owner's property.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Hollow Core Split Faced Scored Units: ASTM C 90.
- B. Hollow Core Units: ASTM C90.
- C. Burnished
- D. Aggregate: Scoria, natural color at exposed block.
- E. Aggregate: Natural color at concealed block.
- F. Mortar: ASTM C 270 "Standard Specification for Mortar for Unit Masonry," Type S, f'c = 1800psi.
- G. Grout: ASTM C 476 "Standard Specification for Grout for Masonry."
- H. Cell Reinforcing: ASTM A 615 "Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," Grade 60. Comply with Section 03 20 00.
- I. Bond Beam and Lintel Reinforcing: ASTM A 615, Grade 60. Comply with Section 03 20 00.
- J. Joint Reinforcing: Hot Dipped Galvanized, Standard Ladder Type 9 Gage Wire Dur-O-Wal or approved equal.

- K. Control Joint Material: Rubber, neoprene or PVC joint material for use with standard sash block by Dur-O-Wal or approved equal.
- L. Vertical Bar Positioner: Steel by Dur-O-Wal or approved equal.
- M. Mortar Plasticizer: Easy Spread by American Colloid Company or approved equal.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide jamb, header, lintel, bond beam, etc. units as required to complete the work. Lay only dry and unfrozen masonry units.
- B. All exposed masonry shall be scoria aggregate, split face, scored finish unless noted otherwise on the drawings. Masonry not exposed to view may be smooth finished.
- C. Discard any broken, chipped, or discolored masonry units.
- D. Use masonry saws to cut and fit masonry units.
- E. Lay units in running bond pattern with vertical joints located at center of masonry units in alternate course below.
- F. Set units plumb, true to line and with level courses accurately spaced.
- G. Adjust masonry unit to final position while mortar is soft and plastic.
- H. Anchors, flashing accessories and similar devices shall be built in as masonry progresses.

3.2 MORTAR

- A. Mix all cementitious materials and sand in a mechanical batch mixer for a minimum of 5 minutes. Adjust the consistency of the mortar to the satisfaction of the mason, but add only as much water as is compatible with convenience in using the mortar. If the mortar begins to stiffen from evaporation or from absorption of a pat if the mixing water, re-temper the mortar immediately by adding water, and remix the mortar.
- B. Mortar for exterior walls shall have waterproofing added in accordance with the manufacturer's recommendations.
- C. Addition of admixtures or re-tempering of mortar at the mixer to extend its use will not be permitted.

3.3 RE-TEMPERING

- A. All mortar shall be used within 2-1/2 hours of initial mixing and no mortar shall be used after it has begun to set. Re-tempering of mortar in which setting has saturated will not be permitted. However, mortar shall be re-tempered, except as above qualified, as necessary to keep it plastic.

3.4 JOINTS

- A. Provide joints 3/8 inch nominal thickness and tooled unless shown otherwise on drawings.
- B. Construct uniform joints.
- C. Units shall be placed with sufficient pressure to extrude mortar and provide a tight joint.

3.5 REINFORCEMENT

- A. Reinforcement shall be secured against displacement prior to grouting at a spacing not greater than 4 feet.
- B. Provide rebar lap lengths specified in the General Structural Notes on the drawings. Provide 6 inches minimum lap for all ladder type joint reinforcing.

3.6 GROUTING

- A. Grout all cells, which are below grade.
- B. Grout lintel blocks over masonry openings and each jamb of masonry openings.
- C. Grout pours shall not exceed 5 feet in height.
- D. Grout all cells solid, which contain reinforcing.

Grout shall have a slump range of 8 to 11 inches tested in accordance with ASTM C143.

Consolidate grout pours 12 inches or less in height by mechanical vibration or by puddling. Consolidate pours exceeding 12 inches in height by mechanical vibration and reconsolidate by mechanical vibration after initial water loss and settlement has occurred. Typically this occurs within 2-4 minutes of placement of grout.

Place grout within 1-1/2 hours from introducing water in the mixture and prior to initial set.

3.7 POINTING AND CLEANING

- A. At completion of unit masonry work, fill holes in joints and tool.
- B. Cut out and repoint defective joints.
- C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.
- D. Leave work and surrounding surfaces clean and free of mortar spots and droppings.

3.8 PROTECTION OF WORK

- A. Protect sills, ledges, and offsets from mortar drippings or other damage during construction.
- B. Remove misplaced mortar or grout immediately.

- C. Cover top of walls with non-staining waterproof coverings when work is not in progress.
- D. Provide adequate bracing during construction to prevent damage from wind loads.

3.9 WEATHER CONDITIONS

- A. Do not place concrete masonry units when air temperature is below 20 degrees F.
- B. For temperatures between 20 degrees F and 40 degrees F, sand and mixing water shall be heated to produce mortar temperatures between 40 degrees F and 120 degrees F. Mortar shall be maintained above 32 degrees F during placement.
- C. Masonry shall be protected from freezing for 24 hours after placement.

3.10 FIELD QUALITY CONTROL

- A. The Owner shall employ the services of a qualified testing laboratory to perform tests and submit test reports.
- B. Concrete Masonry Units (CMU): Test in accordance with ASTM C 140. "Standard Test Methods of Sampling and Testing Concrete Masonry Units." Six units shall be sampled and tested for each lot of 10,000 units or less delivered to the job site. Twelve units shall be sampled from each lot of more than 10,000 units and less than 100,000 units.
- C. Mortar: By proportions according to ASTM C 780 "Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Masonry."
- D. Grout: Mold and test 4 test specimens in accordance with ASTM C 1019 "Test Method for Sampling and Testing Grout" from each day's grout placement. Test grout slump prior to each day's grouting process. Submit slump value with test specimen results. See General Structural Notes for required strength.

END OF SECTION 042200

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. Interior manufactured stone masonry adhered to metal framing and cementitious backer units.

B. Related Requirements:

- 1. Section 092900 "Gypsum Board" for cementitious backer units.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each variety of stone, stone accessory, and manufactured product.
- B. Samples for Initial Selection: For colored mortar and other items involving color selection.
- C. Samples for Verification:
 - 1. For each stone type indicated. Include at least five Samples in each set, and show the full range of color and other visual characteristics in completed Work.
 - 2. For each color of mortar required. Label Samples to indicate types and amounts of pigments used.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, supply sources, and other information as required to identify materials used. Include mix proportions for mortar and source of aggregates.
 - 1. Neither receipt of list nor approval of mockups constitutes approval of deviations from the Contract Documents contained in mockups unless Architect approves such deviations in writing.
- C. Material Test Reports:
 - 1. Stone Test Reports: For each stone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous three years.
 - 2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer, indicating that sealants will not stain or damage stone. Include interpretation of test results and recommendations for primers and substrate preparation needed for adhesion.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs experienced stonemasons and stone fitters.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockups for typical exterior wall in sizes approximately 48 inches (1200 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup construction and accessories.
 - a. Include stone coping at top of mockup.
 - b. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
 - c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit stone masonry above half of flashing).
 - d. Include metal studs, sheathing, building paper or wrap, and flashing in exterior masonry-veneer wall mockup.
 - 2. Protect accepted mockups from the elements with weather-resistant membrane.
 - 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 PRECONSTRUCTION TESTING

- A. Preconstruction Sealant Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for compatibility and adhesion testing according to sealant manufacturer's standard testing methods and Section 079200 "Joint Sealants," Samples of materials that will contact or affect joint sealants.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, in a dry location, or in covered weatherproof dispensing silos.

1.9 FIELD CONDITIONS

- A. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides, and hold cover securely in place.
- B. Stain Prevention: Immediately remove mortar and soil to prevent them from staining stone masonry face.
 - 1. Protect base of walls from rain-splashed mud and mortar splatter, using coverings spread on the ground and over the wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone 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 stone masonry damaged by frost or freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and above 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 602/ACI 530.1/ASCE 6.

1.10 COORDINATION

- A. Advise installers of other work about specific requirements for placement of flashing and similar items to be built into stone masonry.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from single manufacturer with resources to provide materials of consistent quality in appearance and physical properties.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of uniform quality for each cementitious component from single manufacturer and each aggregate from single source or producer.
- C. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with Section 044200 "Exterior Stone Cladding."

2.2 MANUFACTURED MASONRY VENEER:

- A. Material Standards:
 - 1. Maximum Absorption according to ASTM C 97/C 97M: 7.5 percent.
 - 2. Minimum Compressive Strength according to ASTM C 170/C 170M: 2100 psi (14.5 MPa).
- B. Varieties and Sources: Subject to compliance with requirements, provide the following:
 - 1. **Stone Mill Inc., Tulsa Oklahoma LLC.**
- C. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - 1. **[ASM-1]: Weathered Blend, "Tudor."**

2.3 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or Type II, except Type III may be used for cold-weather construction; natural color or white cement may be used as required to produce mortar color indicated.
 - 1. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Lafarge North America Inc.
 - b. Lehigh Hanson; HeidelbergCement Group.
 - c. Mutual Materials Co.
- D. Mortar Cement: ASTM C 1329/C 1329M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Lafarge North America Inc.
- E. Masonry Cement: ASTM C 91/C 91M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - Lafarge North America Inc.
- F. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in stone masonry mortar.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Davis Colors.
 - b. Euclid Chemical Company (The); an RPM company.
 - c. Lanxess Corporation.
 - d. Solomon Colors, Inc.

- G. Colored Portland Cement-Lime Mix: Packaged blend of portland cement, hydrated lime, and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 10 percent of portland cement by weight.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Holcim (US) Inc.
 - b. Lafarge North America Inc.
 - c. Lehigh Hanson; HeidelbergCement Group.
 - d. Mutual Materials Co.
- H. Colored Masonry Cement Mix: Packaged blend of masonry cement and mortar pigments. Mix shall produce color indicated or, if not indicated, as selected from manufacturer's standard colors. Pigments shall not exceed 5 percent of masonry cement by weight.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cemex S.A.B. de C.V.
 - b. Essroc.
 - c. Lafarge North America Inc.
 - d. Lehigh Hanson; HeidelbergCement Group.
 - e. National Cement Company, Inc.
- I. Aggregate: ASTM C 144 and as follows:
1. For pointing mortar, use aggregate graded with 100 percent passing No. 16 (1.18-mm) sieve.
 2. White Aggregates: Natural white sand or ground white stone.
 3. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
 - a. Match Architect's sample.
- J. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Euclid Chemical Company (The); an RPM company.
 - b. Grace Construction Products; W.R. Grace & Co. -- Conn.
 - c. Sonneborn Products.
- K. Water: Potable.

2.4 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.
 - 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. Diedrich Technologies, Inc.; a division of Sandell Construction Solutions.
 - b. Hydroclean; Hydrochemical Techniques, Inc.
 - c. PROSOCO, Inc.

2.5 FABRICATION

- A. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated.
- B. Select stone to produce pieces of thickness, size, and shape indicated, including details on Drawings and pattern specified in "Setting Stone Masonry" Article. Retain first paragraph below for adhered veneer set by tile-setting method.
- C. Gage backs of stones for adhered veneer if more than 81 sq. in. (522 sq. cm) in area.
- D. Thickness of Stone: Provide thickness indicated.
- E. Finish exposed stone faces and edges to comply with requirements indicated for finish and to match approved samples and mockups.

2.6 MORTAR MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - 1. Do not use calcium chloride.
 - 2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
 - 3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - 4. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches required consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Stone Masonry: Comply with ASTM C 270, Property Specification.
 - 1. Mortar for Setting Stone: Type S.
 - 2. Mortar for Pointing Stone: Type N.
- D. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.
- E. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
 - 1. For latex-modified portland cement, setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
- F. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.
- G. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Pigments shall not exceed 5 percent of mortar cement by weight.
 - 3. Mix to match Architect's sample.
- H. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary.
 - 1. Mix to match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces indicated to receive stone masonry, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone masonry.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

3.3 SETTING STONE MASONRY

- A. Perform necessary field cutting and trimming as stone is set.
 - 1. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
 - 2. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
 - 3. Pitch face at field-split edges as needed to match stones that are not field split.
- B. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
- C. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
- D. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
- E. Maintain uniform joint widths, except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than 3/8 inch (10 mm) at narrowest points or more than 1/2 inch (13 mm) at widest points.
- F. Provide sealant joints of widths and at locations indicated.
 - 1. Keep sealant joints free of mortar and other rigid materials.
 - 2. Sealing joints are specified in Section 079200 "Joint Sealants."
- G. Install metal expansion strips in sealant joints at locations indicated. Build flanges of expansion strips into masonry by embedding in mortar between stone masonry and backup wythe. Lap each joint 4 inches (100 mm) in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
- H. Install embedded flashing at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
 - 1. At stud-framed walls, extend flashing through stone masonry, up sheathing face at least 12 inches (300 mm), and behind weather barrier.

2. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches (150 mm) into masonry at each end.
3. At sills, extend flashing not less than 4 inches (100 mm) at ends.
4. At ends of head and sill flashing, turn up not less than 2 inches (50 mm) to form end dams.
5. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
6. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
7. Extend sheet metal flashing 1/2 inch (13 mm) beyond masonry face at exterior, and turn flashing down to form a drip.
8. Install metal drip edges beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face, and adhere flexible flashing to top of metal drip edge.
9. Install metal flashing termination beneath flexible flashing at exterior wall face. Stop flexible flashing 1/2 inch (13 mm) back from exterior wall face, and adhere flexible flashing to top of metal flashing termination.
10. Cut flexible flashing flush with wall face after completing masonry wall construction.

3.4 CONSTRUCTION TOLERANCES

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (10 mm in 6 m), or 1/2 inch in 40 feet (13 mm in 12 m) or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.
- B. Variation from Level: For lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed 1/4 inch in 20 feet (6 mm in 6 m) or 1/2 inch in 40 feet (13 mm in 12 m) or more.
- C. Variation of Linear Building Line: For position shown in plan, do not exceed 1/2 inch in 20 feet (13 mm in 6 m) or 3/4 inch in 40 feet (19 mm in 12 m) or more.
- D. Measure variation from level, plumb, and position shown in plan as a variation of the average plane of each stone face from level, plumb, or dimensioned plane.
- E. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
- F. Variation in Plane between Adjacent Stones: Do not exceed one-half of tolerance specified for thickness of stone.

3.5 INSTALLATION OF ADHERED STONE MASONRY VENEER

- A. Install flashing over sheathing and behind building paper or wrap by fastening through sheathing into framing.

- B. Install lath over building paper or wrap by fastening through sheathing into framing to comply with ASTM C 1063.
- C. Install lath over unit masonry and concrete to comply with ASTM C 1063.
- D. Install scratch coat over metal lath 3/8 inch (10 mm) thick to comply with ASTM C 926.
- E. Coat backs of stone units and face of scratch coat with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar, so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat.
- F. Rake out joints for pointing with mortar to depth of not less than 1/2 inch (13 mm) before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.

3.6 POINTING

- A. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than 3/8 inch (10 mm) deep until a uniform depth is formed.
- B. Point stone joints by placing and compacting pointing mortar in layers of not more than 3/8 inch (10 mm) deep. Compact each layer thoroughly, and allow to it become thumbprint hard before applying next layer.
- C. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
 - 1. Joint Profile: Smooth, flat face slightly below edges of stone, per manufacturer.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace stone masonry of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective joints.
 - 3. Stone masonry not matching approved samples and mockups.
 - 4. Stone masonry not complying with other requirements indicated.
- B. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.

- D. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before cleaning stone masonry.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 4. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
 5. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20, Revised II, using job-mixed detergent solution.
 6. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.
 7. Clean limestone masonry to comply with recommendations in ILI's "Indiana Limestone Handbook."

3.8 EXCESS MATERIALS AND WASTE

- A. Excess Stone: Stack excess stone where directed by Owner for Owner's use.
- B. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
1. Crush masonry waste to less than 4 inches (100 mm) in greatest dimension.
 2. Mix masonry waste with at least 2 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 (450 mm) of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off Owner's property.

END OF SECTION 044313.16

SECTION 047100

BRICK PANEL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SECTION INCLUDES:

- A. Thin brick mounted in metal grid system.

1.3 RELATED SECTIONS:

- A. Section 054000 - Cold-Formed Metal Framing.
- B. Section 061053 - Miscellaneous Rough Carpentry.
- C. Section 061600 - Sheathing.

1.4 REFERENCES:

- A. ASTM International (ASTM):
 1. ASTM C 216 - Standard Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale); severe weather grade kiln-fired brick.
 2. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; specially formulated mortar mix.
 3. ASTM C 513 - Standard Test Method for Obtaining and Testing Specimens of Hardened Lightweight Insulating Concrete for Compressive Strength; for bricks, minimum compression strength of 1000 PSI.
 4. ASTM C 577 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.
 5. ASTM C 666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing, brick, pass.
 6. ASTM C 1088 - Standard Test Method for Thin Veneer Brick Units Made From Clay or Shale; severe weather grade kiln-fired brick.
 7. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
 8. ASTM E 754 - Standard Test Method for Pullout Resistance of Ties and Anchors Embedded in Masonry Mortar Joints.

- B. Miami-Date County Performance Testing:
 - 1. TAS 202 - Uniform Static Pressure Test.
 - 2. TAS 203 - Cyclic Wind Pressure Load Test.

1.5 SUBMITTALS:

- A. Submit under provisions of Section 013000.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Manufacturer's installation instructions, showing required preparation and installation procedures.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Cleaning and maintenance instructions.
- C. Shop Drawings: Provide drawings prepared by the applicator/contractor showing the wall layout, typical details, connections, expansion joints, plus the installation sequence shall be submitted shall be submitted to the architect upon request. Shop drawings shall include the following:
 - 1. Submit elevations, sections and details of assembly components; indicate locations, configurations, large scale plans.
 - 2. Show sequence of installation, attachment details, and weather sealing.
 - 3. Show location of members, other items of work and related work of other Sections to be coordinated with work of this section.
 - 4. Submit detail drawings depicting proper installation and flashing techniques. Coordinate locations with those found on the Contract Drawings.
- D. Quality Assurance Submittals:
 - 1. Copies of test reports by independent laboratories verifying the performance of the system shall be submitted to the Architect upon request.
 - 2. The certified applicator/contractor shall submit a copy of his current 'Certificate of Trained Applicator' from Brick Panel System Manufacturer to the architect prior to the application of the Metal Grid Panel System.
- E. Verification Samples: For each finish product specified, two samples, minimum size 12 inches (305 mm) by 12 inches (305 mm), representing actual products, styles, colors, patterns, and textures.
- F. Warranty: Copy of manufacturer's standard warranty.

1.6 QUALITY ASSURANCE:

- A. Single Source Requirements: Provide primary and secondary components required for installation of thin brick systems from a single source.
- B. Manufacturer Qualifications: Minimum 20 years experience manufacturing similar products.

- C. Installer Qualifications:
 - 1. Received instruction by manufacturer's personnel in the installation of the Brick Panel System Manufacturer and received a 'Certificate of Trained Applicator.'
 - 2. Experienced and competent in the installation of brick type materials.
 - 3. If requested, submit a list of recently completed projects using similar materials.

- D. Performance Testing: Product shall pass the following Miami-Dade County Performance Testing:
 - 1. TAS 201 - Large Missile Impact Test - Pass.
 - 2. TAS 202 - Uniform Static Pressure Test - Pass.
 - 3. TAS 203 - Cyclic Wind Pressure Load Test - Pass.

- E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 - 1. The mock-up shall demonstrate the proposed range of color, texture, and workmanship to be expected in completed work.
 - 2. Locate mock-up on site in location as directed by Architect. Clean the sample panel installation using the same materials and tools as planned for the final construction.
 - 3. Obtain Architect's acceptance of mock-up before start of work.
 - 4. Do not proceed with remaining work until workmanship, color, style, pattern, and texture are approved by Architect.
 - 5. Modify mock-up area as required to produce acceptable work.
 - 6. Remove mock-up at the completion of the work.
 - 7. Mock-up may be incorporated into the work.

- F. Conduct a pre-installation meeting to verify all products, application procedures, site conditions and warranty terms. Conduct in accordance with Section 013100 Project Management and Coordination.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Materials shall be delivered to the location in unopened factory containers. Upon arrival, materials shall be inspected for damage and manufacturer informed of any discrepancies. Deficient materials shall not be used.

- B. Materials shall be stored in a protected location and safeguarded from damage.

1.8 PROJECT CONDITIONS:

- A. The ambient air temperature shall remain at 36 degrees F (2.2 degrees C) or greater for at least 72 hours after the application of mortar.

- B. Flashing and sealants shall be installed immediately after completion of the system. For outdoor application, provide temporary protection as needed from precipitation, wind, airborne dust and debris, and similar items.

- C. Provide protection of surrounding areas and adjacent surfaces from application of brick panel systems.

1.9 COORDINATION/SCHEDULING:

- A. The work in this section requires close coordination with related specifications sections and trades. Sufficient labor and equipment shall be employed to ensure a continuous operation satisfactory to the architect.
- B. Coordinate installation of brick panel systems with related wall elements, including, windows, doors, louvers, ducts, signage, flashings, sealants, weather resistive barrier, sealant tapes and membranes, supporting wall framing and sheathing, surface mounted objects, and similar items.
- C. Coordinate with installation of flashing, coping and sealants to ensure that materials are installed in accordance with manufacturer's instructions.
- D. Coordinate with installation of surface-mounted objects to ensure that watertight seal is provided.

1.10 EXTRA MATERIALS:

- A. At completion of project, deliver to Owner extra stock of materials used on project as follows:
 - 1. Minimum 2 percent of attic stock for each brick type specified.
- B. Store in location as directed by Owner. Ensure materials are boxed and identified by manufacturer, type, and color.

1.11 WARRANTY:

- A. Manufacturer's Warranty: Provide standard 20 year limited warranty.

PART 2 - PRODUCTS

2.1 BRICK PANEL SYSTEMS:

- A. Brick Panel Systems: System for aligning and locking thin brick to a substrate that does not depend on adhesive for its performance.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **TABS TI System; Tabs Wall Systems LLC.**, or a comparable product by one of the following:
 - a. Brick-It Designer Metal Grid System.

- B. Metal Grid System Panels: Galvanized steel metal components formed to align brick courses and to support and ensure a mechanical bond of each brick in place.
1. Panels shall be chem-dry treated, and be a minimum 0.014 inch (0.36 mm) thickness with continuous carrying brick ledges (every course of brick) with minimum thickness per ledge: 0.028 inch (0.71 mm).
 2. Panels shall have a continuous interlock every third course, minimum thickness, 0.042 inch (1.07 mm).
 3. Panels shall be able to fold out corners, door and window sections, and have a continuous linear array of holes to receive adhesive and have a continuous array of mortar receptors to lock in mortar mix.
 4. Panels shall be designed to carry brick load evenly on entire wall surface without the use of footings, starter angles or special corner sections.
 5. Size: 96 inches by 8-1/4 inches (2438 mm by 210 mm).
 6. Brick Configuration: Staggered, standard.
- C. Brick: Kiln-fired brick 1/2 to 1 inch (13 mm to 25 mm) nominal thickness, meeting ASTM C 216 and ASTM C 1088 severe weather requirements, minimum compression strength of 1000 PSI per ASTM C 513, passes freeze/thaw test per ASTM C 666.
1. Brick Color [**B-1**]: “Royal Thin Brick”; Federal Blend.
 2. Type : TBS.
 3. Texture: Distressed.
 4. Smooth back.
- D. Mortar: Premixed mortar supplied by manufacturer, ASTM C 270, Type S.
1. Mortar Color: As selected by the Architect from manufacturer's full range of standard available mortar color options.
- E. Weather Barriers:
1. Water Infiltration barrier shall be Green Guard RainDrop Wrap by Tabs Wall Systems, LLC or Architect approved equivalent.
- F. Fasteners:
1. Fasteners to mount the panel shall be TabGard for use on steel stud installations; or TabCon for use on masonry installations, supplied by Tabs Wall Systems, LLC or equal.
 2. Steel studs, girts or purlins: Self tapping/self drilling fasteners shall penetrate a minimum 1/4" (6.4 mm), or not less than three exposed threads behind the stud flange, girt or purlin.
- G. Adhesives: High solid, solvent based adhesive that remains flexible and unaffected by freeze-thaw cycles.
1. High-strength mastics must exceed ASTM D3498 and ASTM C557 TABS adhesive manufacturer's specifications for TABS with less than 70 grams of VOC per liter with a shear value between the thin veneer and the panel greater than 100 PSI (10.5 kg/cm²).

- H. Water: Shall be clean, potable, and free of all foreign matter.
- I. Cleaner:
 - 1. ProSoCo SureKleen 600.
 - 2. Diedrich Technologies, Inc.; 202 New Masonry Detergent, or 202V Vana -Stop.
- J. Sealant Systems: Reference Section 079200 - Sealants, color as selected by Architect. Joint design and surface preparation shall be based on sealant manufacturer's recommendation and project conditions.
- K. Metal Flashing:
 - 1. TABS Wall System Starter Angle:
 - a. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.0239 inch (24 gauge) pre-bent in 8 or 10 ft. (304.8 cm) lengths.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Prior to installation, examine substrate for conditions including soundness, tightness of connections, crumbling or looseness of surfaces, and projections. Verify substrate is acceptable to authorities having jurisdiction prior to installation of the work of this Section.
- B. Report deviations from the requirements of project specifications or other conditions that might adversely affect the installation to the Contractor. Do not start work until deviations are corrected.

3.2 SUBSTRATE PREPARATION:

- A. Repair damaged or cracked surfaces. Prepare substrate to be flat, within 1/8 inch (3.2 mm) within any 4 foot (1.2 m) square area.
- B. Remove surface contaminants on concrete and concrete masonry surfaces, such as form release oils, dust, paint, waterproofing, and similar items. If required by manufacturer, apply conditioner to substrate by sprayer or roller to chalking or excessively absorptive surfaces.

3.3 INSTALLATION:

- A. Install in accordance with manufacturer's written instructions as applicable to each type of substrate required. Install bricks to specified pattern and mortar.

- B. Metal Grid: Apply to substrate surface in the true level rows, interlock at every panel. Install such that panel does not extend 1/4 inch (6 mm) below the face of the brick.
1. Offset vertical grid joints and leave 1/4 inch (6 mm) between joints. Install for brick to extend past grid by 1/2 inch (13 mm) at grid ends.
 2. Fasten grid system to a sound substrate or wall with a non-corrosive fastener; minimum penetration of substrate is 1 inch (25 mm). Concrete and masonry walls require fasteners and adhesive on rear of metal grid.
 3. Install fasteners on an average of 3 per square foot (0.1 square meters) and at top and bottom courses vertically and a maximum of 16 inches (406 mm) on center horizontally.
- C. Adhesive:
1. Brick shall be spaced to insure that the head joints do not exceed 5/8 inch (16 mm) or fall below 1/4 inch (6.5 mm). The optimum head joint size is 7/16 inch (11 mm).
 2. Use adhesive supplied by manufacturer. For exterior installations, apply 3/8 inch (9.5 mm) vertical dabs. For interior applications, apply 3/8 inch (9.5 mm) beads over adhesive holes as shown in manufacturer's literature.
 3. Do not use excessive adhesive as this will cause bricks to tilt away from grid. Check periodically and repress to grid.
 4. Allow adhesive 24 hours to dry before mortaring.
- D. Brick Placement:
1. Applications Requiring Corners:
 - a. Start with corner brick, or a corner brick at each corner if there are corners at both ends.
 - b. Install bricks adjusting vertical joints for fit or cut brick as required.
 2. Applications that do not required corners:
 - a. Install bricks in direction of arrows as shown in manufacturer's literature.
 - b. Place adhesive on two rows of grid in the middle of wall.
 - c. Adjust vertical joints to fit area, 3/8 inch to 1/2 inch (9.5 mm to 13 mm), to fit wall space.
 - d. Cut end bricks as needed. Install bricks horizontally than vertically.
 - e. Draw a plumb vertical line every 48 inches (1219 mm) to help maintain spacing.
- E. Mortar:
1. Allow adhesive to fully cure before mortaring joints.
 2. Use clean, cold water to mix mortar. Flush hoses regularly; especially during warm weather.
 3. Slightly dampen bricks before mortaring; especially during hot weather.
 4. Mix properly and test a sample area.
 5. Do not apply mortar to brick panel system when the ambient outdoor temperature is below 36 degrees F (2.2 degrees C) unless temporary protection and heat can be provided for a minimum of 36 hours after installation.

6. Apply mortar into horizontal joints first, then vertical joints. Over fill joints with sufficient mortar to avoid leaving any voids. When mortar attains a firm consistency joints shall be tooled.
7. Strike the vertical joints first than horizontal joints. Provide concave finish. Fill voids.

F. Control Joints & Expansion Joints:

1. Control joints in the panel system are required to coincide with the building control joints where substrates change, within 2'- 4' of outside corners, then 25' to 30' for steel stud framing.

G. Weep Holes and Venting:

1. Standard weep holes for draining wall panels can be formed by omitting mortar/sealant at intervals of one.

3.4 FIELD QUALITY CONTROL:

- A. Arrange and pay for project inspection by Brick Panel System Manufacturer or its authorized representative to confirm warranty will be provided. Notify Architect 48 hours in advance of inspection.

3.5 CLEANING AND PROTECTION:

- A. Cleaning: As recommended by manufacturer. Do not begin cleaning until mortar joints are properly cured. Allow a minimum of 24 to 72 hours. Soak bricks and mortar joints before applying cleaner.
 1. Thoroughly flush wall after cleaning.
 2. Clean adjacent materials and surfaces of all foreign materials resulting from the work of this Section.
- B. Protection:
 1. Protect installed materials from water impinging on the visible surface, chinking, sealants joints, and from behind.
 2. Protect installed materials from dust, dirt, precipitation, freezing, damaged, spilled materials, and continuous high humidity until they are fully dry.

END OF SECTION 047100

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Cast stone cap stone.
- B. Related Sections include the following:
 - 1. Division 04 Section "Adhered Stone Masonry Veneer" for adhered stone masonry veneer.
 - 2. Division 05 Section "Sheet Metal Flashing and Trim" for concealed metal flashing.
 - 3. Division 07 Section "Sealants" for sealant joints between cap units.

1.3 DEFINITIONS:

- A. Cast Stone: An architectural stone unit manufactured to copy fine grain texture and color of natural cut stone used in unit masonry applications. Meets ASTM C 1364 requirements.
 - 1. Dry Cast Concrete Products: Manufactured from zero-slump concrete.
 - a. Vibrant Dry Hand Tamp Casting Method: Vibratory compaction by hand tamp of earth-moist, zero-slump concrete against rigid mold until it is densely compacted.
 - 2. Wet Cast Concrete Products: Manufactured from measurable slump concrete.
 - a. Wet Casting Method: Manufactured from measurable slump concrete and consolidated into a mold.

1.4 SUBMITTALS:

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for cast stone units.
- B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions; details of reinforcement and anchorages, if any; and indication of finished faces.
 - 1. Include building elevations showing layout of units and locations of joints and anchors.
- C. Samples: For each color and texture of cast stone required, 10 inches square in size.
- D. Samples for Verification: For each mortar color required, showing the full range expected in the finished construction. Make samples using the same sand and mortar ingredients to be used on Project. Label samples to indicate type and amount of colorant used.
- E. Full-Size Samples: For each type of cast stone unit required. Make available for Architect's review at Project site before installing cast stone.
 - 1. Approved Samples may be installed in the Work.

- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
 - 1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C 1364.
- G. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of cast stone with requirements indicated.

1.5 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: A firm experienced in manufacturing cast stone units similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to manufacture required units.
- B. Testing Agency Qualifications: An independent testing agency qualified according to ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations for Cast Stone: Obtain cast stone units through one source from a single manufacturer.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups of typical exterior wall area not less than 72 inches (1800 mm) long by 48 inches (1200 mm) high.
 - a. Include typical components, attachments to building structure, and methods of installation.
 - b. Include window opening with stone returns, trim.
 - c. Include sealant-filled joint complying with requirements in Section 079200 "Joint Sealants."
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Pack, handle, and ship cast stone units in suitable packs or pallets.
 - 1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast stone units, if required, using dollies with wood supports.
 - 2. Store cast stone units on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.
- B. Store installation materials on elevated platforms, under cover, and in a dry location.

1.7 COORDINATION:

- A. Coordinate production and delivery of cast stone with unit masonry work to minimize the need for on-site storage and to avoid delaying the Work.

1.8 WARRANTY:

- A. Special Manufacturer's Warranty: Written warranty, signed by cast stone manufacturer agreeing to replace cast stone masonry material that does not comply with requirements or that does not remain watertight during specified warranty period.
 - 1. Warranty Period: Ten (10) years after date of Substantial Completion.
- B. The following conditions are considered a cause for rejection pursuant to ASTM C 1364:
 - 1. Cracking exceeding that as defined by CSI Technical Bulletin #32.
 - 2. Efflorescence exceeding that as defined by CSI Technical Bulletin #33.
 - 3. Minor chipping of the Product resulting from transportation, handling or installation that is obvious under direct daylight illumination from a 20-ft. distance (see CSI Standard Specification 04 72 00).
 - 4. Dimensional variations of the Product regarding length, cross-section, warp, bow or twist, location of dowel holes, anchor slots, flashing grooves, false joints and similar features that are not within the tolerances set forth in ASTM C 1364.
 - 5. Color variations that are outside the permissible range set forth in ASTM C 1364.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Design Product: Subject to compliance with requirements, provide RockCast, Reading Rock; distributed by Mack Brick, tel: (860) 627-6625, or a comparable product by one of the following:
 - 1. Durastone, Portland, ME, tel:(207) 797-3552.
 - 2. W.N. Russell & Company, Westmont, NJ, tel:(800) 227-8995.
 - 3. Sun Precast Company, McClure, PA, tel:(717-658-8000.
 - 4. United Cast Stone, tel: (940) 383-2887.

2.2 CAST STONE MATERIALS:

- A. General: Comply with ASTM C 1364 and the following:
- B. Portland Cement: ASTM C 150, Type I, containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C 33; gradation as needed to produce required textures.
- D. Fine Aggregates: Manufactured or natural sands complying with ASTM C 33, gradation as needed to produce required textures.
- E. Air-Entraining Admixture: ASTM C 260, certified by the manufacturer to be compatible with other admixtures used.
 - 1. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 5 to 7 percent.
- F. Reinforcement: Deformed steel bars complying with ASTM A 615/A 615M.
 - 1. Epoxy Coating: ASTM A 775/A 775M.

2.3 CAST STONE UNITS:

- A. Provide cast stone units complying with ASTM C 1364.
 - 1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C 1364.
 - 2. Minimum Compressive Strength: 5,000 psi.
- B. Reinforce units as indicated and as required by ASTM C 1364. Use epoxy-coated reinforcement.
- C. Fabricate units with sharp arris and details accurately reproduced with indicated texture on all exposed surfaces, unless otherwise indicated.
 - 1. Slope exposed horizontal surfaces at least 1:12, unless otherwise indicated.
 - 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3. Provide drips on projecting elements, unless otherwise indicated.
- D. Cure and finish units as follows:
 - 1. Cure units in totally enclosed curing room under dense fog and water spray at 95 percent relative humidity for 24 hours.
 - 2. Yard cure units until the sum of the mean daily temperatures for each day equals or exceeds 350 deg F.
 - 3. Acid etch units to remove cement film from surfaces indicated to be finished.
- E. Colors and Textures: Match Architect's sample.
- F. Custom Cap Units: Manufactured to dimensions indicated on the Drawings. Smooth texture.

2.4 ACCESSORIES:

- A. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666, Type 304.
- B. Dowels: 1/2-inch- (12-mm-) diameter, round bars, fabricated from Type 304 stainless steel complying with ASTM A 240/A 240M, ASTM A 276, or ASTM A 666.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.5 MORTAR MIXES:

- A. Comply with requirements in Division 4 Section "Unit Masonry" for mortar mixes.

2.6 SOURCE QUALITY CONTROL:

- A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.
 - 1. Include testing for freezing and thawing resistance.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of cast stone.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Install cast stone units to comply with requirements in Division 4 Section "Unit Masonry" for installing stone units.
- B. Set cast stone as indicated on Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place. Set units accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
- C. Drench units with clear water just before setting.
- D. Set units in full bed of mortar, unless otherwise indicated. Build anchors and ties into mortar joints as units are set.
 - 1. Fill dowel holes and anchor slots with mortar.
 - 2. Fill collar joint solid as units are set.
 - 3. Build concealed flashing into mortar joints as units are set.
 - 4. Leave head joints open in coping and other units with exposed horizontal surfaces. Keep joints clear of mortar, and rake out to receive sealant.
- E. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
 - 1. Sealing joints is specified in Division 7 Section "Joint Sealants."
- F. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- G. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - 1. Sealing joints is specified in Division 7 Section "Joint Sealants."
 - 2. Keep joints free of mortar and other rigid materials.

3.3 INSTALLATION TOLERANCES:

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.

- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not exceed 1/16-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

3.4 ADJUSTING AND CLEANING:

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses. Remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.
 - 3. **WARNING!** Wash down of masonry should be conducted before window installation. Steel windows have a factory applied final finish. **Acid based chemicals typically used for masonry wash down will attack the finish surfaces.** Rusting of exposed metal may result.

END OF SECTION 047200

SECTION 050513SHOP-APPLIED COATINGS FOR METALPART 1 - GENERAL1.1 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 specifies hot-dip galvanizing and shop-applied primer coat for metal fabrications including, but not limited to exterior structural steel, exterior loose steel lintels, railings and pipe rail.
- B. Related Sections include the following:
 - 1. Section 055213 "Pipe and Tube Railings" for the shop priming of steel railings.
 - 2. Section 05500 "Metal Fabrications" for the shop priming of miscellaneous steel fabrications.

1.3 REFERENCE STANDARDS:

- A. Comply with applicable portions of the following reference standards:
 - 1. ASTM A 123: Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 - 2. ASTM A 143: Safeguarding Against Embrittlement.
 - 3. ASTM A 153: Standard Specification for Zinc (Hot Dip Galvanizing) on Iron and Steel Hardware.
 - 4. ASTM A 384: Safeguarding Against Warpage.
 - 5. ASTM A 385: Providing High Quality Zinc Coatings.
 - 6. ASTM A 780: Repair of Hot Dip Galvanizing.

1.4 SUBMITTALS:

- A. Samples: Submit two 3 inch by 6 inch samples of shop-applied coatings and colors proposed for use for approval prior to coating application.
 - 1. Verification Sample: Provide verification sample to Architect for approval of surface texture and color prior to full fabrication and production. Direct fabricator to provide galvanizer with sample of actual material to receive hot-dip galvanizing and shop applied finish coating. Direct galvanizer to hot-dip galvanize and finish sample in selected color

- B. Certificate of Compliance from Galvanizer: Submit notarized Certificate of Compliance with application for payment for galvanizing, signed by galvanizer, indicating compliance with requirements of specifications. Include scope of services provided, and quantity and itemized description of items processed.
- C. Visual Stamp: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the coating, and the applicable ASTM Specification Numbers.

1.5 QUALITY ASSURANCE:

- A. Pre-Construction Conference for Metal Fabrications: Contractor shall schedule a meeting to be attended by Contractor, Owner’s Representative, fabricator, and galvanizer. Agenda shall include the following: Project schedule, scope of metal fabrications, coordination between fabricator and galvanizer, finish of surfaces, application of coatings, submittals, color matching, and approvals.
- B. Coordination Between Fabricator and Galvanizer: Prior to fabrication, direct fabricator to submit approved shop drawings to the galvanizer for all fabrications. Direct galvanizer to review fabricator’s shop drawings for suitability of materials for galvanizing and coatings and coordinate any required modifications to fabrications required to be done by the fabricator.
- C. Steel Materials: For steel to be hot dip-galvanized, provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
 - 1. To prevent unnecessary damage to the galvanized coating by field welding, provide slip-fit method of connecting pipe railings. Fabricate pipe railing from mechanical steel tubing internally vented with holes $\frac{3}{4}$ the size of the pipe’s internal diameter. For other fabrications, bolted connections shall be used wherever possible.
 - 2. Assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.
- D. Engage the services of a galvanizer who has demonstrated a minimum of five (5) years experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coatings within the same facility as outlined herein. The Architect has the right to inspect and approve or reject the galvanizer/galvanizing facility.
- E. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program acceptable to the Architect which has been in effect for a minimum of five years and shall provide the Architect with process and final inspection documentation.
- F. The galvanizer/galvanizing facility must have an on-premise testing facility capable of measuring the chemical and metallurgical composition of the galvanizing bath and pickling tanks.

- G. In-process paint application shall be monitored with a wet film gage and the measurements recorded. Dry film thickness measurement shall be by Tooke Gage and Magnetic Coating Thickness gage.
- H. Provide and apply materials complying with environmental requirements of authority having jurisdiction. All materials shall be delivered to the galvanizer with label or product data sheet affixed to the manufacturer's containers showing the manufacturer's name, batch number, type of paint, stock number, label analysis of solids and vehicle, reducing and thinning instructions, drying and recoat time, MSDS sheets, recommended application procedures and environmental restrictions. Paint materials shall be stored in an accepted location reserved only for such materials and related equipment in compliance with applicable local health and fire regulations and OSHA requirements.
- I. The galvanizer/galvanizing facility must have a dedicated, on-premise painting and curing facility for the exclusive use of coating galvanized steel. Said facility shall utilize the following:
 - 1. Recording hygrometer to measure air temperature and humidity.
 - 2. A spray booth conforming to OSHA regulations with filtered exhaust.
 - 3. A convection hot air curing system with solvent vapor removal ability.
 - 4. The curing booth shall be heated using an indirect thermostat controlled gas fired forced hot air blower. The booth shall be protected with a sprinkler system complying with NFPA 15. The air in the curing booth shall be continuously monitored by a lower explosive limit (LEL) monitoring device connected to the ventilation system. The booth shall be capable of reaching 150° F with a sustained capability of 100° F.

PART 2 - PRODUCTS

2.1 ACCEPTABLE SYSTEMS:

- A. Fabricators: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AZZ Galvanizing, Tulsa, OK, (918) 584-0303
 - 2. North American Galvanizing Co., Tulsa, OK (918) 488-9420.
 - 3. Valmont Coating, Claremore. OK, (918) 266-2800.

2.2 HOT-DIP GALVANIZING AND FACTORY-APPLIED PRIMER:

- A. Hot-Dip Galvanizing: For exterior steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.
 - 1. Comply with ASTM A 123 for fabricated products and ASTM A 153 for hardware.
 - 2. Provide thickness of galvanizing specified in referenced standards.
 - 3. Galvanizing bath shall contain special high grade zinc and other earthly materials.
 - 4. Fill vent holes after galvanizing, if applicable, and grind smooth.

- B. Factory-Applied Primer over Galvanized Steel: Provide factory-applied prime coat, certified OTC/VOC compliant less than 2.8 lbs/gal. and conforming to EPA and local requirements. Apply primer within 12 hours after galvanizing at the same galvanizer's plant in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Primer coat shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments. Blast cleaning of the surface is unacceptable for surface preparation. Primer shall have a minimum two year re-coat window for application of finish coat. Coatings must meet or exceed the following performance criteria as stipulated by the coatings manufacturer:
1. Abrasion Resistance: ASTM D 4060 (CS17 Wheel, 1,000 grams load). 1kg load, 200 mg loss.
 2. Adhesion: ASTM D4541, 1050 psi.
 3. Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.
 4. Direct Impact Resistance: ASTM D2794, 160 in. lbs.
 5. Flexibility: Method: ASTM D522, 180 degree bend, 1 inch mandrel, passes.
 6. Pencil Hardness: ASTM D3363, 3B.
 7. Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.
 8. Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.
 9. Warranty: Provide galvanizer's warranty that materials will be free from 10 percent or more visible rust for a period of 20 years.

PART 3 - EXECUTION

3.1 APPLICATION OF GALVANIZING AND METAL COATINGS:

- A. Galvanize materials in accordance with referenced standards and this specification.
- B. Galvanizing shall provide an acceptable substrate for applied coatings.
- C. The dry kettle process shall be used to eliminate any flux inclusions on the surface of the galvanized material. Prior to galvanizing, the steel shall be immersed in a pre flux solution (zinc ammonium chloride). The pre flux tank must be 12° to 14° Baumé and contain less than 0.4% iron. The wet kettle process shall be prohibited.
- D. To provide the galvanized surface required, the following procedures shall be implemented:
 1. A monitoring recorder shall be utilized and inspected regularly to observe any variances in the galvanizing bath temperature.
 2. The pickling tanks shall contain hydrochloric acid with a constant range between 10-14%, iron content less than 8% and zinc content less than 3%. Titrations shall be taken weekly at a minimum.
 3. Rinse tanks, for the removal of cleaning chemicals, shall contain water.

4. Water quenching of galvanized steel shall be prohibited.
- E. The primer material shall be certified VOC compliant < 2.9 lbs/gal., and conform to the following: and conform to all environmental and EPA standards and requirements.
 1. The primer shall be a high solid polyamide epoxy applied to a DFT of 3 mils minimum.
- F. Apply primer over hot-dip galvanizing within 12 hours after galvanizing in the galvanizer's facility in accordance with specified requirements and recommendations of galvanizer.
- G. The primer shall be applied under the following conditions:
 1. Minimum air temperature shall be 65° F. Surface temperature of steel shall be 60°-95° F and, in any event, be 5° F higher than the dew point. Humidity shall be 85% maximum.
 2. Surface of steel shall be dry and free from dust, dirt, oil, grease or other contaminants. Coating and cure facility shall be maintained free of airborne dust and dirt until coatings are completely cured.
 3. The primer shall be applied by way of airless spray over a consistent surface profile, 1.5 mil minimum. The profile shall be measured and permanently recorded with Test- Tex tape.
 4. The use of iron or steel shot and sand and aluminum oxide grit as a blast medium, and power wire brushes are not permitted.
- H. Installation: Comply with fabricator's and galvanizer's requirements for installation of materials and fabrications, including use of nylon slings or padded cables for handling shop-primed or shop-finished materials.
- I. Touch-Up and Repair: For damaged and field-welded metal coated surfaces, clean welds, bolted connections and abraded areas.
 1. At galvanized surfaces, apply organic zinc repair paint complying with requirements of ASTM A 780. Galvanizing repair paint shall have 95 percent zinc by weight, ZRC Cold Galvanizing Compound. Thickness of applied galvanizing repair paint shall be not less than coating thickness required by ASTM A 123 or A 153 as applicable. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.
 2. At shop-primed or shop-finished surfaces, touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.
 3. The galvanizer/galvanizing facility must have an ongoing touch-up and repair program acceptable to the Architect which has been in effect for a minimum of five years.
 4. Provide a touch up repair kit.

END OF SECTION 050513

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes the fabrication and erection of structural steel.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Steel Joists - Section 05 21 00
- B. Metal Deck - Section 05 30 00
- C. Painting – Section 09 91 00

1.3 QUALITY ASSURANCE

- A. Qualifications of Fabricator: Fabricator shall have a minimum of 5 years experience in the fabrication of structural steel of structures of similar size. Fabricator shall have AISC or IAS certification or other certification as approved by the building official and the engineer of record. If the fabricator does not have approved certification, special inspection shall be done on the fabrication process and on the fabricated material as required by Section 1704.2, Inspection of Fabricators of the International Building Code. The non-certified fabricator shall engage a special inspector that meets the requirements of IBC section 1704.1 and is acceptable to the building official and the engineer of record. Provide documentation verifying certification or provide special inspector information for approval prior to issuance of a building permit.
- B. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel of structures of similar size.
- C. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.
- D. Reference Standards, latest edition of the following:
 - 1. ASTM International (ASTM)
 - a. ASTM A 36/
A36M Standard Specification for Carbon Structural Steel
 - b. ASTM A 53/
A 53M Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless
 - c. ASTM A 61/
A6M Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

- d. ASTM A 307 Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- e. ASTM A 325 Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
- f. ASTM A 490 Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength
- g. ASTM A 500/A500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
- h. ASTM A 992/A 992M Standard Specification for Structural Steel Shapes
- i. ASTM C 1107/C1107M Standard Specification for Packaged Dry, Hydraulic-Cement Grout (non-shrink)
- j. ASTM F1554 Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.

- 2. American Welding Society (AWS), latest edition.
 - a. AWS D1.1 Structural Welding Code-Steel
- 3. American Institute of Steel Construction (AISC), Steel Construction Manual, latest edition.
 - a. Specification for Structural Steel Buildings
 - b. AISC Code of Standard Practice
 - c. Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.

1.4 SUBMITTALS

- A. Shop Drawings: Submit shop drawings including erection plans, complete details and schedules for fabrication and assembly of structural steel members. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols, and show size, length, and type of each weld. Shop drawings shall not be made by reproduction of the Contract Drawings.
- B. Provide setting drawings and directions for installation of anchor bolts and other anchorages to be installed by others.
- C. Welder Certification: Submit affidavit stating that all welders are certified in accordance with AWS and provide copies of welder's certificates.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support structural steel above ground on skids, pallets, platforms, or other supports.
- B. Protect steel from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- E. Replace damaged shapes or members.
- F. Waste Management and Disposal; As specified in Division 01 Section "Construction Waste Management" and as follows: Collect cut offs and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. All Wide Flange Shapes shall conform to ASTM A 992, Grade 50 unless noted otherwise.
- B. All Angles, Channels, Plates, and Bars: ASTM A 36.
- C. Structural Steel Pipe: ASTM A 53, Type E or S, Grade B Fy=35 ksi
- D. Rectangular or Square Hollow Structural Section: ASTM A 500, Grade B, Fy = 46 ksi.
- E. Round Hollow Structural Sections: ASTM A 500, Grade B, Fy-42 ksi.
- F. Anchor Bolts: ASTM F1554, Grade 36
- G. High Strength Tension Control Threaded Fasteners: Meet requirements of ASTM A 325 or ASTM A 490.
- H. Headed Anchor Shear Studs: By the Nelson Division of TRW.
- I. Welding Electrodes: E 70 Series.
- J. Shop Primer Paint: Fabricators standard rust inhibitive primer.
- K. Non-Metallic, Non-Shrink Grout: Meets the requirements of ASTM C 1107.
- L. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time. Grout shall have a minimum 28 day compressive strength of 6,000 psi.

1. Subject to compliance with requirements, provide products by one of the following or an approved equal:
 - a. Five Star Fluid Grout 100; Five Star Products, Inc., Fairfield, Connecticut.
 - b. Crystex; L&M Construction Chemicals, Inc. Omaha, Nebraska.
 - c. Sure-Grip High Performance Grout; Dayton superior Corp., Miamisburg, Ohio.
 - d. Sonnogrout 10K; Sonneborn Building Products, Shakopee, Minnesota.
 - e. Sealight Pac-It Grout; W.R. Meadows, Inc., Hampshire, Illinois.
 - f. Enduro 50; Conspec Marketing & Manufacturing Co., Inc, Kansas City, Kansas.

2.2 FABRICATION

- A. Fabrication shall be in accordance with the AISC "Code of Standard Practice for Buildings and Bridges".
- B. Connections: Weld or bolt shop connections as indicated on the approved shop drawings. Design connections to support reactions and forces where indicated on the drawings.
- C. Shop Welds: Shall be visually inspected by the Fabricator's quality control department.

2.3 SHOP PAINTING

- A. General: Shop paint structural steel, except those members or portions of members to be embedded in concrete, mortar or to receive sprayed on fireproofing. Paint embedded steel, which is partially exposed on exposed portions and initial 2 inch of embedded areas only.
- B. Do not paint surfaces, which are to be welded or high-strength bolted with friction-type connections.
- C. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust, loose mill scale, and spatter, slag or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 1. SP-1 "Solvent Cleaning"
 2. SP-2 "Hand Tool Cleaning"
 3. SP-3 "Power Tool Cleaning". For Architecturally Exposed Structural Steel, AESS, see Architectural drawings for locations.
- D. Painting: After surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions. Provide one coat.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Field Measurements: Verify all elevations, locations, and dimensions of surfaces to receive structural steel.
- B. Anchor Bolts and Other Embedded Items: Verify locations and positions of anchor bolts and other embedded items used to support structural steel.

All Anchor bolts for column base plates, anchors and bearing plates for beams shall be located prior to installation by a Registered Professional surveyor. The Professional Surveyor shall use project control points, such as bench marks, grid lines, or building corners established and accurately maintained by the General Contractor for vertical and horizontal control of location. Templates shall be used to locate groupings of bolts or anchors and shall be confirmed as to orientation and hole geometry accuracy.

Anchor bolts and bearing plates with anchors shall be stabilized against movement, vertical and horizontal, prior to and during concrete casting of concrete supporting these devices.

Upon completion of the concrete casting the Professional Surveyor shall verify vertical and horizontal locations and orientation of anchor bolts or bearing plates with anchors. A report shall be furnished to the Engineer of Record (through the General Contractor and Architect) noting non compliant locations. The EOR, will furnish remedial actions required to correct the non compliant anchor bolt or bearing plate locations. Allow ten days for the EOR's report on remedial actions necessary.

It shall be the General Contractor's responsibility to have this work performed.

- C. Correct any unsatisfactory conditions prior to erection of structural steel.

3.2 PREPARATION

- A. Clean surfaces to receive structural steel prior to erection.

3.3 ERECTION

- A. General: Erect structural steel in accordance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Field Assembly: Assemble structural steel accurately to the lines and elevations shown on the drawings. Align and adjust components accurately before fastening.
- C. Temporary Bracing: Provide temporary bracing or guys to secure structural steel against wind, seismic, or construction loads. It is the responsibility of the Contractor to maintain stability of the structure during erection.

- D. Field Bolted Connections: Install high strength tension control bolts in accordance with AISC Specifications for Structural Joints Using ASTM A325 and A490 Bolts and the manufacturer's instructions. Where clearance within a connection does not permit the use of tension control bolts, standard A325 bolts shall be used and inspected in accordance with the AISC Specification for Structural Joints.
- E. Field Welding: Perform all welds in accordance with AWS.
- F. Welded Connections: Field welds shall be visually inspected according to AWS D1.1/D1.1M.
 - a. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - i. Liquid Penetrant Inspection: ASTM E 165.
 - ii. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - iii. Ultrasonic Inspection: ASTM E 164.
 - iv. Radiographic Inspection: ASTM E 94
- G. Gas Cutting: Do not use gas-cutting torches in field to cut structural framing.
- H. Do not enlarge unfair holes by burning. Ream holes that must be enlarged to admit bolts.
- I. Field Touch-up Painting (Primer): Paint all exterior exposed bolts, washers, and nuts after connections have been tightened and checked. Paint all exterior exposed field welds. Paint all exterior exposed abrasions in shop coat. Use same paint as for shop painting.
- J. Grout Placement: Comply with the manufacturer's instructions.
- K. Tighten anchor bolts after supported members have been positioned and plumbed.

END OF SECTION 051000

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes the fabrication and erection of open web steel joists.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Structural Steel - Section 05 10 00
- B. Painting – Section 09 91 00

1.3 QUALITY ASSURANCE

- A. Qualification of Fabricator: Fabricator shall be a member of the Steel Joist Institute.
- B. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.
- C. Reference Standards, latest versions of the following:
 - 1. ASTM International
 - a. ASTM A 307 Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
 - 2. Steel Joist Institute (SJI) Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders
 - a. Standard Specifications and Load Tables, Open Web Steel Joists, K-Series. SJI
 - b. Standard Specifications and Load Tables for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DHL Series SJI

1.4 SUBMITTALS

- A. Certification: Submit manufacturer's certification that joists comply with SJI Specifications.
- B. Shop Drawings: Submit detailed drawings showing layout of joist units, special connections, jointing and accessories. Include mark, number, type, location and spacing of joists and bridging. Shop Drawings shall not be made by reproduction of the Contract Drawings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support structural steel above ground on skids, pallets, platforms, or other supports
- B. Protect steel from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures.
- E. Replace damaged shapes or members.
- F. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
 - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Steel: Comply with SJI Specifications.
- B. Unfinished Threaded Fasteners: ASTM A 307, Grade A, regular hexagon type, low carbon steel.
- C. Steel Prime Paint: Comply with SJI Specifications.

2.2 FABRICATION

- A. Fabricate steel joists in accordance with SJI Specification.
- B. Extended Ends: Provide extended ends on joists as required complying with applicable SJI Specifications and load tables.
- C. Ceiling Extensions: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide an extended bottom chord element of sufficient strength to support ceiling construction. Extend ends to within ½ inch of finished wall surface unless otherwise indicated.
- D. Bridging: Provide horizontal or diagonal type bridging for "open web" joists, as required by SJI Specifications.
- E. Shop Painting: Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.
- F. Apply one shop coat of primer paint to steel joists and accessories, by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 0.50 mil.

PART 3 - EXECUTION

3.1 COORDINATION

- A. Verify all elevation locations and dimensions of surfaces to receive steel joists. Furnish plates, angles, etc. as required to secure steel joists.

3.2 ERECTION

- A. Place and secure steel joists in accordance with SJI Specifications, approved shop drawings, and as herein specified.
- B. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.
- C. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.
- D. Fastening Joists: Field weld joists to supporting steel framework in accordance with SJI Specifications for type of joists used. Coordinate welding sequence and procedure with placing of joists unless noted on contract drawings. Bolt joists to supporting steel framework where required by SJI Specifications.
- E. Touch-Up Painting: After joist installation, paint field bolt heads and nuts, and welded areas, abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use same type of paint as used for shop painting.

END OF SECTION 052100

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Provide all metal decking complete in place as shown on the drawings, specified herein, and needed for a complete and proper installation.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Structural Steel - Section 05 10 00
- B. Steel Joists - Section 05 21 00
- C. Cold-Formed Metal Framing - Section 05 40 00
- D. Painting – Section 09 91 00

1.3 QUALITY ASSURANCE

- A. Reference Standards, latest editions of the following:
 - 1. Qualification of Field Welders: Welders shall be certified in accordance with AWS D1.3 within the last 12 months.
 - 2. ASTM International.
 - a. ASTM A 653/
A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - b. A 1008/
A 1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability
 - c. ASTM A 1011/
A 1011M Standard Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low Alloy with Improved Formability, and Ultra- High-Strength
 - 3. American Welding Society (AWS), latest edition.
 - a. D1.3 Structural Welding Code - Sheet Steel
 - 4. Steel Deck Institute.

- a. SDI Design Manual for Floor Decks, Form Decks and Roof Decks
- b. SDI Diaphragm Design Manual Third Edition

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's specifications and installation instructions for each type of decking and accessories.
- B. Shop Drawings: Submit detailed drawings showing layout and types of deck panels, anchorage details, and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories. Shop Drawings shall not be made by reproduction of the Contract Drawings.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Support metal deck above ground on skids, pallets, platforms or other supports.
- B. Protect metal deck from damage.
- C. Store packaged materials in original unbroken package or container.
- D. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
 - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Roof Deck: ASTM A 1008, Grade C. See plans for type, size and finish. Metal deck used in fire rated assemblies shall meet the requirements of UL. The UL mark on the product will be accepted as evidence of compliance.
- B. Metal Floor Deck: ASTM A 1011 with galvanized finish. See plans for type and size.
- C. Finishes:
 - 1. Painted: Manufacturer's baked-on, rust-inhibitive paint.
 - 2. Galvanized: Conform to ASTM A 653, G60.

PART 3 - EXECUTION

3.1 COORDINATION

- A. All edge angle shall be in place with proper attachment prior to installation of metal deck. All roof and floor opening frames shall be installed prior to deck installation.

3.2 INSTALLATION

- A. General: Install deck units and accessories in accordance with manufacturer's recommendations and final shop drawings, and as specified herein. Locate deck bundles to prevent overloading of structural members.
- B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.
- C. Place deck units in straight alignment for entire length of run.
- D. Place deck units flat and square secured to adjacent framing without warp or excessive deflection.
- E. Lap ends of deck units a minimum of 2 inches over supports.
- F. Place deck units to permit proper attachment to the perimeter deck angle.
- G. Do not use deck units for storage or working platforms until permanently secured.
- H. Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.
- I. Fasten deck units to steel supporting members as shown on the structural drawings.
- J. Fasten side laps of units as called for on the structural drawings.
- K. Care shall be exercised in the selection of electrodes and amperage to provide positive welds and to prevent high amperage blowholes.
- L. Comply with AWS D1.3 requirements and procedures.
- M. Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking and support of other work shown.
- N. Install closure strips at all locations as recommended by the manufacturer to provide a complete installation.
- O. Provide cleaning and touch-up painting of field welds, abraded areas and rust spots, as required for all exposed areas after erection and before proceeding with field painting.

END OF SECTION 053000

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section includes all lightgauge studs, joists and track, 20 gage or heavier, including bridging, and related accessories as indicated on the Contract Drawings and specified herein.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Structural Steel - Section 05 10 00
- B. Steel Joists - Section 05 21 00
- C. Painting – Section 09 91 00

1.3 QUALITY ASSURANCE

- A. Reference Standards, latest editions of the following:
 - 1. American Iron and Steel Institute (AISI) North American Specification for the Design of Cold-Formed Steel Structural Members.
 - 2. American Welding Society of (AWS) D1.3, Structural Welding Code-Sheet Steel.
 - 3. ASTM International.
 - a. ASTM A 653/
A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - b. A 1008/
A 1008M Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low Alloy, High-Strength Low Alloy with Improved Formability
 - c. ASTM A 1011/
A 1011M Standard Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low Alloy with Improved Formability, and Ultra-High-Strength
 - 4. Qualifications of Erector: Erector shall have a minimum of 5 years experience in the erection of structural steel of structures of similar size.
 - 5. Qualifications of Field Welders: Welders shall be certified in accordance with AWS D1.1 within the last 12 months.

1.4 SUBMITTALS

- A. Submit manufacturer's product information and installation instructions for each item of lightgage framing. Submit shop drawings for all prefabricated lightgage systems.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Protect metal framing units from rusting and damage. Deliver to project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type, and grade. Store off ground in a dry ventilated space or protect with suitable waterproof coverings.
- B. Waste Management and Disposal: As specified in Division 01 Section "Construction Waste Management" and as follows:
 - 1. Collect off cuts and scrap and place in designated area for recycling in accordance with the Waste Management Plan and local recycler standards.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Framing:
 - 1. All 12, 14, and 16 gage steel studs and joists shall be formed from steel that meets the requirements of one of the following standards with a minimum yield strength of 50,000 psi:
 - a. Painted Material - ASTM A 1011, Grade 50.
 - b. Galvanized Material - ASTM A 653 Grade 50.
 - 2. All 18 and 20 gage steel studs and joists; all track, bridging and accessories shall be formed from steel that meets the requirements of one of the following with a minimum yield strength of 33,000 psi:
 - a. Painted Material - ASTM A 1008, Grade C.
 - b. Galvanized Material - ASTM A 653.
- B. Material Finishes: All stud and joist components shall be primed with paint meeting the performance requirements of TT-P-1636C, or shall be formed from steel having a G-60 galvanized coating or better.

2.2 FABRICATION

- A. Framing components may be prefabricated into panels prior to erection. Prefabricated panels shall be square, with components attached to prevent racking. Handling and lifting of panels shall be done in a manner as to not cause distortion in any member.
- B. All framing components shall be cut squarely for attachment to perpendicular members, or as required for an angular fit against abutting members. Members shall be held positively in place until properly fastened.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install metal framing systems in accordance with manufacturer's printed instructions and recommendations, unless otherwise indicated on Contract Drawings.
- B. Install and align tracks accurately to layout at base and tops of studs. Secure tracks as indicated on Contract Drawings. Provide fasteners at corners and ends of tracks.
- C. Install supplementary framing, blocking and bracing in metal framing system to support fixtures, equipment, etc. Comply with stud manufacturer's recommendations and industry standards, considering weight and loading of each item.
- D. Secure studs to top and bottom tracks by welding at both inside and outside flanges or with a minimum of 2-#8 self tapping screws (one per flange) up to 16 gage material and 2-#10 self tapping screws (one per flange) for 14 gage and thicker, unless noted otherwise.
- E. Frame wall openings larger than 2 foot-0 inches square with double studs at each jamb of frame except where more than 2 are either shown or indicated in manufacturer's instructions. 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.
- F. All components of build-up stud sections, including jack studs, full height studs, columns, headers, etc. shall be welded together with utilizing 1/8" fillet welds 1" long at 12" on center along the full height of each flange to flange connection.
- G. Install horizontal bridging in stud system, spaced (vertical distance) at no more than 4 foot – 0 inches o.c. Weld at each intersection.
- H. Touch-up shop-applied protective coatings damaged during handling and installation. Use compatible primer for prime coated surfaces; use galvanizing repair paint for galvanized surfaces, such as zinc-rich paint.

END OF SECTION 054000

SECTION 055000METAL FABRICATIONSPART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 2. Loose bearing and leveling plates.
 3. Metal ladders.
 4. Ladder safety cages.
 5. Metal bollards.
 6. Metal stair treads for exterior cast-in-place concrete stairs.
 7. Steel shapes for supporting elevator door sills.
 8. Elevator pit sump covers.
- B. Products furnished, but not installed, under this Section include the following:
1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 2. Bearing plates, inserts and other incidental items of structural or miscellaneous steel where shown in the Drawings and/ or required to be built into concrete, masonry or other construction.
 3. All miscellaneous steel members supporting penetrations of roof, floor or wall openings larger than 18-inches square.
- C. Related Sections include the following:
1. Division 03 Section "Cast-In-Place Concrete" for installing anchor bolts, steel pipe sleeves, wedge-type inserts and other items indicated to be cast into concrete.
 2. Division 05 Section "Shop-Applied Coatings for Metal" for galvanizing and shop priming exterior ladders and bollards.
 3. Division 05 Section "Structural Steel."
 4. Division 05 Section "Pipe and Tube Railings."
 5. Division 06 Section "Miscellaneous Rough Carpentry" for metal framing anchors.

1.3 PERFORMANCE REQUIREMENTS:

- A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F(67 deg C), ambient; 180 deg F(100 deg C), material surfaces.

- C. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

1.4 SUBMITTALS:

- A. Product Data: For the following:
 - 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 - 2. Metal nosings.
 - 3. Paint products.
 - 4. Grout.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 2. Provide templates for anchors and bolts specified for installation under other Sections.
 - 3. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For professional engineer.
- E. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE:

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

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.7 COORDINATION:

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

2.2 METALS, GENERAL:

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

2.3 METALS:

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- D. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
 2. Material: Galvanized steel complying with ASTM A 653/A 653M, 0.108-inch (2.8-mm) nominal thickness.
- E. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated or required by structural loads.
- F. 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.
- G. Aluminum Plate and Sheet: ASTM B 209(ASTM B 209M), Alloy 6061-T6.
- H. Aluminum Extrusions: ASTM B 221(ASTM B 221M), Alloy 6063-T6.
- I. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061

2.4 FASTENERS:

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

- B. Steel 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. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593((ASTM F 738M)) for bolts and ASTM F 594((ASTM F 836M)) for nuts, Alloy Group 1 (A1).
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3((ASME B18.6.7M)).
- G. Lag Bolts: ASME B18.2.1((ASME B18.2.3.8M)).
- H. Plain Washers: Round, ASME B18.22.1((ASME B18.22M)).
- I. Lock Washers: Helical, spring type, ASME B18.21.1((ASME B18.21.2M)).
- J. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
- K. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, 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 Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material for Anchors in Exterior Locations: Alloy Group 1 (A1) stainless-steel bolts complying with ASTM F 593((ASTM F 738M)) and nuts complying with ASTM F 594((ASTM F 836M)).

2.5 MISCELLANEOUS MATERIALS:

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79.
 - 1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

- E. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi(20 MPa)), unless otherwise indicated.

2.6 FABRICATION, GENERAL:

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch(1 mm)), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches(3.2 by 38 mm), with a minimum 6-inch(150-mm) embedment and 2-inch(50-mm) hook, not less than 8 inches(200 mm) from ends and corners of units and 24 inches(600 mm) o.c., unless otherwise indicated.

2.7 MISCELLANEOUS FRAMING AND SUPPORTS:

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
 - 1. Fabricate units from slotted channel framing where indicated.
 - 2. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Provide bearing plates welded to beams where indicated.
 - 2. Drill girders and plates for field-bolted connections where indicated.
 - 3. Where wood nailers are attached to girders with bolts or lag screws, drill holes at 24 inches (600 mm) o.c.
- E. Galvanize miscellaneous framing and supports where indicated.
- F. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 LOOSE BEARING AND LEVELING PLATES:

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates after fabrication.
- C. Prime plates with zinc-rich primer.

2.9 STEEL WELD PLATES AND ANGLES:

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with not less than two integrally welded steel strap anchors for embedding in concrete.

2.10 METAL LADDERS:

- A. General:
 - 1. Comply with ANSI A14.3 unless otherwise indicated.
- B. Steel Ladders:
 - 1. Space siderails 18 inches (457 mm) apart unless otherwise indicated.
 - 2. Space siderails of elevator pit ladders 12 inches (300 mm) apart.
 - 3. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
 - 4. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
 - 5. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 6. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.

7. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
8. Galvanize and prime exterior ladders, including brackets and fasteners.
 - a. Comply with Section 050513 “Shop-Applied Coatings for Metal”
9. Prime ladders, including brackets and fasteners, with zinc-rich primer.

2.11 EXTERIOR LADDERS

A. Manufacturer:

1. Acceptable Manufacturer: Precision Ladders, LLC, which is located at: P. O. Box 2279 ; Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Email: info@PrecisionLadders.com; Web: www.PrecisionLadders.com

B. Aluminum Fixed Vertical Ladder:

1. Aluminum Fixed Vertical Ladder and Components: Ladder, cage, rest platforms, floor mounting brackets, security doors, walk-thru, and side rails.
 - a. Model: FL -*** (***= vertical height in inches) Aluminum Fixed Vertical Ladder as manufactured by Precision Ladders LLC.
 - b. Capacity: Unit shall support a 1500 lb (680 kg) loading without failure, and individual treads shall withstand a 3,000 lb (1361 kg) loading without failure.
 - c. Performance Standard: Units designed and manufactured to meet or exceed ANSI A14.3 and OSHA 1910.27.
2. Components:
 - a. Ladder Stringer: 2-1/2 inch by 1-1/16 inch by 1/8 inch (64 mm by 27 mm by 3 mm) extruded 6005-T5 aluminum channel. Pitch: 90 degrees.
 - b. Ladder Tread: 2-1/4 inch by 3/4 inch by 1/4 inch (57 mm by 19 mm by 6 mm) extruded 6005-T5 aluminum with deeply serrated top surface.
 - c. Ladder Mounting Bracket: 8-1/2 inch by 2 inch by 3 inch by 1/4 inch thick (216 mm by 51 mm by 76 mm by 6 mm) aluminum angle.
 - d. Walk-Thru:
 - 1) Hand Rails: 1-1/4 inch (32 mm) aluminum square tube with rounded edges.
 - 2) Mounting Brackets: 4 inch by 4 inch by 1/4 inch (102 mm by 102 mm by 6 mm) aluminum.
 - 3) Side Rails: 42 inch (1067 mm) side rail extension for through ladder exits.
 - e. Safety Cage:
 - 1) Vertical and horizontal bars: 1/4 inch by 2 inch (6 mm by 51 mm) 6005-T5 aluminum flat bar.
 - f. Rest Platform:
 - 1) 1/8 inch (3 mm) aluminum tread plate.
 - 2) Platform Size: 30” inches by 48 inches (762 mm by 1219 mm) standard.
 - 3) Toe Boards. 6005 T-5 aluminum.
 - 4) Handrails: 1-1/4 inch (32 mm) aluminum square tube 42 inches (1067 mm) high.
 - g. Security Door: 0.125 inch (3 mm) 3003-H14 aluminum panel 84 inches (2134 mm) tall with padlock provision.
 - h. Security Gate: Hinged gate at bottom of cage with padlock provision.

- i. Fall Prevention System: Complete system with rail, sleeves, and harness to limit any fall to 6 inches (152 mm) or less.
- j. Floor Brackets: Floor bracket at foot of each stringer, 3 by 2 by 1/4 inch (76 by 51 by 6 mm).
- k. Finishes:
 - 1) Standard: Mill finish on aluminum ladder components.

2.12 METAL BOLLARDS:

- A. Fabricate metal bollards from Schedule 40 steel pipe.
- B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch-(6.4-mm-) thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches(200 mm) deep and 3/4 inch(19 mm) larger than OD of bollard.
- C. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch(6.4-mm) wall-thickness steel tubing with an OD approximately 1/16 inch(1.5 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4-inch(19-mm) steel machine bolt.
- D. Hot Dip galvanize and shop prime bollards with zinc-rich primer.
 - 1. Comply with Section 050513"Shop-Applied Coatings for Metal."

2.13 ABRASIVE NOSINGS:

- A. Cast-Metal Units: Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Safety Tread Co., Inc.
 - b. Barry Pattern & Foundry Co., Inc.
 - c. Safe-T-Metal Company, Inc.
 - d. Wooster Products Inc.
 - 2. Configuration: Cross-hatched units, 3 inches(75 mm) wide without lip.
 - a. Basis of Design: Type 101SP; Wooster Products Inc.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
- C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

2.14 ELEVATOR PIT SUMP COVERS

- A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual."
- B. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
 - 1. Bearing Bar Spacing: 1-3/16 inches (30 mm) o.c.
 - 2. Bearing Bar Depth: 1-1/2 inch (38.1 mm).
 - 3. Bearing Bar Thickness: 3/16 inch (4.8 mm).
 - 4. Crossbar Spacing: 4 inches (102 mm) o.c.

- 5. Traffic Surface: Smooth.
- C. Provide 1-1/2" x 1-1/2" x 1/8" steel angle supports.
- D. Galvanize and prime elevator pit sump cover, including brackets and fasteners.
 - a. Comply with Section 050513 "Shop-Applied Coatings for Metal"

2.15 FINISHES, GENERAL:

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

2.16 STEEL AND IRON FINISHES:

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
 - 1. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, 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. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS:

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - 1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
- D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - 1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING BEARING AND LEVELING PLATES:

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - 1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
 - 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 ADJUSTING AND CLEANING:

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

- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055113

METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. Section Includes:

- 1. Preassembled interior steel stairs with concrete-filled treads.
- 2. Preassembled exterior galvanized steel stairs with concrete-filled treads.

B. Related Requirements:

- 1. Section 033000 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.

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.
- C. Coordinate locations of hanger rods and struts with other work so that they do not encroach on required stair width and are within the fire-resistance-rated stair enclosure.

1.4 ACTION SUBMITTALS:

- A. Product Data: For metal pan stairs
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- C. 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 the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- C. Regulatory Requirements: Railings and handrails:
 - 1. Top of gripping surfaces of handrails shall be 34" minimum and 38" maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
 - 2. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2" minimum. Handrail may be located in a recess if the recess is 3" maximum deep and 18" minimum clear above the top of the handrail.
 - 3. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20% of their length. Where provided, horizontal projections shall occur 1-1/2" minimum below the bottom of the handrail gripping surfaces.
 - 4. Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1-1/4" minimum and 2" maximum.
 - 5. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4" minimum and 6-1/4" maximum, and a cross-sectional dimension of 2-1/4" maximum.
 - 6. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
 - 7. Handrails shall not rotate within their fittings.
 - 8. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 - 9. A 2" minimum high curb or a barrier shall be provided to prevent the passage of a 4" diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp.

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. Alfab, Inc.
 - 2. American Stair, Inc.
 - 3. Lapeyre Stair Inc.
 - 4. Pacific Stair Corporation.
 - 5. Worthington Metal Fabricators.

2.2 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 or 1/4 inch (6.4 mm), whichever is less.
- 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.

2.3 METALS:

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating, either commercial steel, Type B, or structural steel, Grade 33 (Grade 230), unless another grade is required by design loads.

2.4 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 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/E 488M, conducted by a qualified independent testing agency.
 - 1. 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).

2.5 MISCELLANEOUS MATERIALS:

- A. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- D. Concrete Materials and Properties: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa) unless otherwise indicated.
- E. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
- F. Welded Wire Reinforcement: Galvanized, welded wire reinforcement, 2 by 2 inches (50 by 50 mm) by 0.062-inch- (1.6-mm-) diameter wire; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.

2.6 FABRICATION, GENERAL:

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. Weld exposed corners and seams continuously unless otherwise indicated.
 - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS:

- A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.
- B. Stair Framing:
 - 1. Fabricate stringers of steel plates or channels.
 - a. Provide closures for exposed ends of channel stringers.

2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements indicated.
 3. Weld stringers to headers; weld framing members to stringers and headers.
 4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch (1.7 mm).
1. Steel Sheet: Galvanized-steel sheet.
 2. Directly weld metal pans to stringers; locate welds on top of subtreads where they are concealed by concrete fill. Do not weld risers to stringers.
 3. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 4. Shape metal pans to include nosing integral with riser.
 5. Attach abrasive nosings to risers.
 6. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
 - a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.8 FINISHES:

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS:

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."

3.2 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 099100 "Painting".

END OF SECTION 055113

SECTION 055213

PIPE AND TUBE RAILINGS

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Steel pipe and bar handrails and railings.
- B. Related Sections include the following:
 - 1. Division 05 Section "Shop Applied Coating for Metals" for galvanizing and shop priming exterior steel pipe handrails and railings.
 - 2. Division 05 Section "Metal Pan Stairs" for steel pipe handrails and railings included with metal stairs.

1.3 PERFORMANCE REQUIREMENTS:

- A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials based on the following:
 - 1. Steel: 72 percent of minimum yield strength.
 - 2. Cold-Formed Structural Steel: AISI SG-673, Part I, "Specification for the Design of Cold-Formed Steel Structural Members."
- B. Structural Performance of Handrails and Railings: Provide handrails and railings capable of withstanding the following structural loads without exceeding allowable design working stresses of materials for handrails, railings, anchors, and connections:
 - 1. Top Rail of Guards: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied horizontally and concurrently with uniform load of 100 lbf/ft. applied vertically downward.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.
 - 2. Handrails Not Serving As Top Rails: Capable of withstanding the following loads applied as indicated:
 - a. Concentrated load of 200 lbf applied at any point and in any direction.
 - b. Uniform load of 50 lbf/ft. applied in any direction.
 - c. Concentrated and uniform loads above need not be assumed to act concurrently.

3. Infill Area of Guards: Capable of withstanding a horizontal concentrated load of 200 lbf applied to 1 sq. ft. at any point in system, including panels, intermediate rails, balusters, or other elements composing infill area.
 - a. Loads above need not be assumed to act concurrently with loads on top rails in determining stress on guard.
- C. Thermal Movements: Provide handrails and railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, over stressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. 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. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.
 1. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Product Test Reports: From a qualified testing agency indicating products comply with requirements, based on comprehensive testing of current products.
- E. Product Test Reports: From a qualified testing agency indicating handrails and railings comply with ASTM E 985, based on comprehensive testing of current products.

1.5 QUALITY ASSURANCE:

- A. 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 handrails and railings that are similar to those indicated for this Project in material, design, and extent.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

- C. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.
- D. Regulatory Requirements: Railings and handrails:
 1. Top of gripping surfaces of handrails shall be 34" minimum and 38" maximum vertically above walking surfaces, stair nosings, and ramp surfaces. Handrails shall be at a consistent height above such surfaces.
 2. Clearance between handrail gripping surfaces and adjacent surfaces shall be 1-1/2" minimum. Handrail may be located in a recess if the recess is 3" maximum deep and 18" minimum clear above the top of the handrail.
 3. Handrail gripping surfaces shall be continuous along their length and shall not be obstructed along their tops or sides. The bottoms of handrail gripping surfaces shall not be obstructed for more than 20% of their length. Where provided, horizontal projections shall occur 1-1/2" minimum below the bottom of the handrail gripping surfaces.
 4. Handrail gripping surfaces with a circular cross section shall have an outside diameter of 1-1/4" minimum and 2" maximum.
 5. Handrail gripping surfaces with a non-circular cross section shall have an outside dimension of 4" minimum and 6-1/4" maximum, and a cross-sectional dimension of 2-1/4" maximum.
 6. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
 7. Handrails shall not rotate within their fittings.
 8. Handrail gripping surfaces shall extend beyond and in the same direction of stair flights and ramp runs. Such extensions are not required for continuous handrails at the inside turn of switchback or dogleg stairs and ramps.
 9. A 2" minimum high curb or a barrier shall be provided to prevent the passage of a 4" diameter sphere rolling off the sides of a ramp surface. Such a curb or a barrier shall be continuous and uninterrupted along the length of a ramp..

1.6 STORAGE:

- A. Store handrails and railings in a dry, well ventilated, weather tight place.

1.7 PROJECT CONDITIONS:

- A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedules with construction progress to avoid delaying the Work.
 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION:

- A. Coordinate installation of anchorages for handrails and 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.

1.9 SCHEDULING:

- A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.1 METALS:

- A. General: Provide metal free from pitting, seam marks, roller marks, stains, discolorations, and other imperfections where exposed to view on finished units.
- B. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- C. Steel and Iron: Provide steel and iron in the form indicated, complying with the following requirements:
 - 1. Steel Pipe: ASTM A 53; finish, type, and weight class as follows:
 - a. Black finish, unless otherwise indicated.
 - b. Galvanized finish for exterior installations and where indicated.
 - c. Type F, or Type S, Grade A, standard weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 2. Steel Tubing: Cold-formed steel tubing, ASTM A 500, Grade A, unless another grade is required by structural loads.
 - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails, unless otherwise indicated.

2.2 WELDING MATERIALS, FASTENERS, AND ANCHORS:

- A. Welding Electrodes and Filler Metal: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Fasteners for Anchoring Handrails and Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring handrails and railings to other types of construction indicated and capable of withstanding design loads.
 - 1. For steel handrails, railings, and fittings, use plated fasteners complying with ASTM B 633, Class Fe/Zn 25 for electro deposited zinc coating.
- C. Cast-in-Place and Postinstalled Anchors: Anchors of type indicated below, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 1. Cast-in-place anchors.

2. Expansion anchors.

2.3 PAINT:

- A. Shop Primers: Provide primers to comply with applicable requirements in Division 9 Section "Painting."
- B. Shop Primer for Ferrous Metal: Fast-curing, lead and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- C. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

2.4 GROUT AND ANCHORING CEMENT:

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

2.5 FABRICATION:

- A. General: Fabricate handrails and 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.
 1. Configurations: As indicated on Drawings.
- B. Assemble handrails and 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. Form changes in direction of railing members as follows:
 1. As detailed.
 2. By bending.
- D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout an entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
- E. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove 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.
- F. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
- G. Provide inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
- H. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches long with inside dimensions not less than ½ inch greater than outside dimensions of post, and steel plate forming bottom closure.
- I. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.
- J. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radiuses possible without causing grain separation or otherwise impairing the Work.
- K. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.
- L. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
- M. Fabricate joints that will be exposed to weather in a watertight manner.
- N. Close exposed ends of handrail and railing members with prefabricated end fittings.
- O. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between the end of railing and wall is 1/4 inch or less.

2.6 FINISHES, GENERAL:

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

2.7 STEEL FINISHES:

- A. Galvanized Handrails and Railings: Hot-dip galvanize exterior steel and iron handrails and railings to comply with ASTM A 123. Hot-dip galvanize hardware for exterior steel and iron handrails and railings to comply with ASTM A 153/A 153M.
- B. 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. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

- D. For nongalvanized steel handrails and railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- E. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
- F. 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 handrails and railings:
 - 1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."
 - 2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."
- G. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - 1. Do not apply primer to galvanized surfaces.
 - 2. Stripe paint edges, corners, crevices, bolts, and welds.

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 to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.
 - 1. Do not weld, cut, or abrade surfaces of handrail and 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.
- C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at the interval indicated, but not less than that required by structural loads.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and 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.

3.4 ANCHORING POSTS:

- A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturers' written instructions:
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger 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 the following anchoring material, mixed and placed to comply with anchoring material manufacturers' written instructions:
 - 1. Nonshrink, nonmetallic grout.
- C. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch build-up, sloped away from post.

3.5 ANCHORING RAILING ENDS:

- A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with postinstalled anchors and bolts unless otherwise indicated.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.
 - 1. Weld flanges to railing ends.

3.6 ATTACHING HANDRAILS TO WALLS:

- A. Attach handrails to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
- B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- C. Secure wall brackets to building construction as follows:
 - 1. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.7 CLEANING:

- A. Touch Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION:

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

END OF SECTION 055213

SECTION 057000DECORATIVE METALPART 1 - GENERAL1.1 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 grilles at Cage.
 - 2. Bar top machine vent grilles.
 - 3. Screen panel supports.
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for non-decorative metal fabrications.
 - 2. Section 090001 "Schedule of Finishes."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative metal.
 - 1. Include plans, elevations, component details, and attachments to other work.
 - 2. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of linear shapes.
 - 2. Samples of welded and brazed joints showing quality of workmanship and color matching of materials.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

1.5 QUALITY ASSURANCE

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

- C. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 2. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- E. Preinstallation Conference: Conduct conference at Project site.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups for the following types of decorative metal:
 - a. One panel at Cage window.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
- B. Deliver and store cast-metal products in wooden crates surrounded by sufficient packing material to ensure that products will not be cracked or otherwise damaged.

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

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

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

2.2 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.

2.3 STEEL AND IRON

- A. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.4 BRONZE

- A. Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS C28000 (muntz metal, 60 percent copper).

2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Aluminum Items: Aluminum fasteners.
 - 2. Copper-Alloy (Bronze) Items: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed, muntz metal (Alloy 280) fasteners where exposed.
 - 3. Dissimilar Metals: Type 304 stainless-steel fasteners.
 - 4. Uncoated-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 304 stainless-steel fasteners where exposed.
- B. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
- C. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated.
 - 1. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Low-Emitting Paints and Coatings: Paints and coatings applied to interior decorative metal items shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Lacquer for Copper Alloys: Clear, acrylic lacquer specially developed for coating copper-alloy products.
- D. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

2.7 FABRICATION, GENERAL

- A. Assemble items 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.
- B. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- E. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
- G. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

2.8 DECORATIVE STEEL WINDOW SECURITY BARS at CAGE:

- A. General: Fabricate decorative window grilles to designs indicated from steel bars and shapes of sizes and profiles indicated. Form steel bars by bending, forging, coping, mitering, and welding.
- B. Welding: Interconnect grille members with full-length, full-penetration welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.
- C. Brackets, Fittings, and Anchors: Provide wall brackets, fittings, and anchors to connect decorative window grilles to other work unless otherwise indicated.
 - 1. Furnish inserts and other anchorage devices to connect decorative window grilles to concrete and masonry work. Coordinate anchorage devices with supporting structure.
 - 2. Fabricate anchorage devices that are capable of withstanding loads indicated.
- D. Finish: Powder coated finish.
 - 1. Color: Custom. Match Architect's sample.
- E. Manufacturer: Pinecrest Inc.

2.9 SCREEN PANEL SUPPORTS

- A. Product: Aluminum Counter Posts; CR Laurence Co., Inc.
 - 1. Height: 24 inches.
 - 2. Finish: Duranodic Bronze.
 - 3. Center Post: #6407424.
 - 4. End Post: #6407524.
 - 5. Post Caps: #6406000, CRL Counter Post Flat Top Cap, black finish.
 - 6. Post Mounting Base: #6406002, CRL Counter Post Mounting Base for Sculptured Style Posts.

2.10 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.

2.11 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes
- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As indicated on Drawings.

2.12 STEEL AND IRON FINISHES

- A. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
 - 1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
 - 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than .5 mils (0.04 mm).
 - 4. Color: As indicated by manufacturer's designations. Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- B. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
 - 1. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
- G. 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.

3.3 INSTALLING DECORATIVE GRILLE WORK AT CAGE:

- A. Fasten security bar frames to concrete and masonry walls with cast-in-place or postinstalled anchors. Peen exposed threads of anchors to prevent removal of security bars.

3.4 CLEANING AND PROTECTION

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Substantial Completion.
- C. 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.
- D. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 057000

SECTION 057300

DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Aluminum ornamental railings with laser cut panels.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
- B. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
 - b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 3. Infill of Guards:
 - a. Concentrated load of 200 lbf (0.89 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
 - b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
 - c. Infill load and other loads need not be assumed to act concurrently.

- C. Thermal Movements: Provide exterior railings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Manufacturer's product lines of railings assembled from standard components.
 - 2. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. For illuminated railings, include wiring diagrams and roughing-in details.
- C. Samples for Initial Selection: For products involving selection of color, texture, or design, including mechanical finishes.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Each type of glass required.
 - 3. Fittings and brackets.
 - 4. Welded connections.
 - 5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
- E. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
- F. Welding certificates.
- G. Qualification Data: For professional engineer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing through one source from a single manufacturer.

- B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to test railings according ASTM E 894 and ASTM E 935 for compliance with specified requirements for performance. Payment for these services will be made by Owner. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
 - 1. Provide test specimens and assemblies representative of proposed materials and construction.
 - 2. Fabricate and install test assemblies using personnel who will perform the same tasks for Project.
 - 3. Select sizes and configurations of assemblies to adequately demonstrate capability of railings to comply with performance requirements.
 - 4. Notify Architect seven days in advance of the dates and times when assemblies will be constructed.
 - 5. When testing is complete, remove assemblies; do not reuse materials on Project.
- E. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups for each form and finish of railing consisting of two posts, bottom and top rail, infill area, and anchorage system components that are full height and are not less than 12 inches (600 mm) in length.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - 2. Provide allowance for trimming and fitting at site.

1.8 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not 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. Aluminum Decorative Railings:
 - a. Architectural Metal Works.
 - b. Architectural Railings & Grilles, Inc.
 - c. ATR Technologies, Inc.
 - d. Blum, Julius & Co., Inc.
 - e. Blumcraft of Pittsburgh; C.R. Laurence Co, Inc.
 - f. Braun, J. G., Company.
 - g. CraneVeyor Corp.
 - h. Laurence, C. R. Co., Inc.
 - i. Livers Bronze Co.
 - j. Newman Brothers, Inc.
 - k. Pisor Industries, Inc.
 - l. Platers Polishing Company.
 - m. Poma Corporation.
 - n. Sterling Dula Architectural Products, Inc; Div. of Kane Manufacturing..
 - o. Superior Aluminum Products, Inc.
 - p. Wagner, R & B, Inc.
 - q. Wylie Systems.

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. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

2.3 ALUMINUM

- A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Extruded Bars and Shapes, Including Extruded Tubing: ASTM B 221/ASTM B 221M, Alloy 6063-T5/T52.
- C. Plate and Sheet: ASTM B 209/ASTM B 209M, Alloy 6061-T6.
- D. Die and Hand Forgings: ASTM B 247/ASTM B 247M, Alloy 6061-T6.

- E. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

2.4 FASTENERS

- A. General: Provide the following:
1. Aluminum Components: Type 304 stainless-steel fasteners.
 2. Dissimilar Metals: Type 304 stainless-steel fasteners.
- 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.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work, unless otherwise indicated.
1. Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.
- D. Anchors: Provide cast-in-place, chemical or torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

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 (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. 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.
- H. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 1. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- I. Form changes in direction as follows:
 - 1. As detailed.
- J. Close exposed ends of hollow railing members with prefabricated end fittings.
- K. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.7 GLAZING PANEL FABRICATION

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

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- 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 same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. 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.

3.2 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.
- C. 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 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to 1 side, and locate joint within 6 inches (150 mm) of post.

3.3 ANCHORING POSTS

- A. Use steel pipe 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 inches (125 mm) deep and 3/4 inch (20 mm) larger 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; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) buildup, sloped away from post.
- D. Anchor steel posts to steel with flanges, angle or floor type as required by conditions, welded to posts and bolted to metal supporting members.

- E. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For aluminum railings, attach posts as indicated using fittings designed and engineered for this purpose.

3.4 ANCHORING RAILING ENDS

- A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.

3.5 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.6 PROTECTION

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

END OF SECTION 057300

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Wood furring, grounds, nailers, and blocking.
 - 2. Sheathing for equipment backing panels.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 06 Section "Interior Architectural Woodwork" for interior woodwork not specified in this Section.

1.3 SUBMITTALS:

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
 - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
 - 3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.
- C. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with performance requirements indicated.
- D. Warranty of chemical treatment manufacturer for each type of treatment.

1.4 DELIVERY, STORAGE, AND HANDLING:

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
 - 1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL:

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority (Canadian).
 - 3. SPIB - Southern Pine Inspection Bureau.
 - 4. WCLIB - West Coast Lumber Inspection Bureau.
 - 5. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece.
- D. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 1. Provide dressed lumber, S4S, unless otherwise indicated.
 - 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS:

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWWA C2 (lumber) and AWWA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.

- B. Pressure treat aboveground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft.. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members less than 18 inches above grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS:

- A. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Use Exterior type for exterior locations and where indicated.
 - 3. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - 4. Use Interior Type A, unless otherwise indicated.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- C. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Plywood backing panels.

2.4 MISCELLANEOUS LUMBER:

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.
- D. Species: Douglas fir or southern yellow pine.
- E. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.5 MISCELLANEOUS MATERIALS:

- A. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

2.6 WOOD-BASED STRUCTURAL-USE PANELS:

- A. Structural-Use Panel Standards: Provide either all-veneer, mat-formed, or composite panels complying with DOC PS 2, "Performance Standard for Wood-Based Structural-Use Panels," unless otherwise indicated. Provide plywood panels complying with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood," where plywood is indicated.
- B. Trademark: Factory mark structural-use panels with APA trademark evidencing compliance with grade requirements.
- C. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 5/8 inch thick.

2.7 FASTENERS:

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where miscellaneous carpentry is exposed to weather, in ground contact, pressure-preservative treated or in area of high relative humidity, provide fasteners with a double-hot-dip zinc coating per ASTM A 153 or of Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: FS FF-N-105.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1. (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

- A. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated lumber and plywood.
- E. Securely attach carpentry work as indicated and according to applicable codes and recognized standards.
- F. Countersink nail heads on exposed carpentry work and fill holes with wood filler.
- G. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.2 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS:

- A. Install where shown and where required for screeding or attaching other work. Cut and shape to required size. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3.3 WOOD FURRING:

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.

3.4 INSTALLATION OF STRUCTURAL-USE PANELS:

- A. General: Comply with applicable recommendations contained in APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
 - 1. Comply with "Code Plus" provisions of above-referenced guide.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Plywood Backing Panels: Screw to supports.

END OF SECTION 061053

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
1. Wall sheathing.
 2. Flexible flashing at openings in sheathing.
- B. Related Sections include the following:
1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 SUBMITTALS:

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 3. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Fire-retardant-treated plywood.

1.4 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

1.5 DELIVERY, STORAGE, AND HANDLING:

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

PART 2 - PRODUCTS

2.1 GYPSUM WALL SHEATHING:

- A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
- B. Product: Subject to compliance with requirements, provide one of the following:
 - 1. "Dens-Glass FireGuard Sheathing;" G-P Gypsum Corporation.
 - 2. "GlasRoc;" Certainteed.
 - 3. "Securock;" United States Gypsum Company.
 - 4. "GOLD BOND brand e2XP EXTENDED EXPOSURE SHEATHING;" National Gypsum.
- C. Type and Thickness: Type "X", 5/8 thick, unless otherwise noted.
- D. Size: 48 by 96 inches (1219 by 2438 mm) for vertical installation.

2.2 FASTENERS:

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - 1. For steel framing less than 0.0329 inch (0.835 mm) thick, attach sheathing to comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick, attach sheathing to comply with ASTM C 954.

2.3 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS:

- A. Sealant for Glass-Mat Gypsum Sheathing Board: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing, and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
- B. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

2.4 MISCELLANEOUS MATERIALS:

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.0 mm).
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.
 - c. MFM Building Products Corp.; Window Wrap.
 - d. Polyguard Products, Inc.; Polyguard 300.
 - e. Protecto Wrap Company; BT-20 XL.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL:

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION:

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
 - 3. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.

- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
1. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (9.5 mm) from edges and ends of boards.

3.3 FLEXIBLE FLASHING INSTALLATION:

- A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
1. Prime substrates as recommended by flashing manufacturer.
 2. Lap seams and junctures with other materials at least 4 inches (100 mm), except that at flashing flanges of other construction, laps need not exceed flange width.
 3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 4. Lap weather-resistant building paper over flashing at heads of openings.
 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

SECTION t062023INTERIOR FINISH CARPENTRYPART 1 - GENERAL1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Interior trim, including standing and running trim.
 2. Interior stairs.
- B. Related Requirements:
1. Section 061000 "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 2. Section 099300 "Staining and Transparent Finishing" for staining and finishing interior finish carpentry.
 3. Section 099123 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.
- B. MDO: Plywood with a medium-density overlay on the face.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.
 3. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.
- B. Samples for Verification:
1. For each species and cut of lumber and panel products with non-factory-applied finish, with ½ of exposed surface finished, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.
 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For fire-retardant-treated wood, from ICC-ES.
- B. Sample Warranty: For manufacturer's warranty.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Composite Wood Products: Products shall be made without urea formaldehyde.
- B. Lumber: DOC PS 20 and the following grading rules:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association, "Standard Grading Rules for Northeastern Lumber."
 - 2. NHLA: National Hardwood Lumber Association, "Rules for the Measurement and Inspection of Hardwood & Cypress."
 - 3. NLGA: National Lumber Grades Authority, "Standard Grading Rules for Canadian Lumber."
 - 4. SPIB: The Southern Pine Inspection Bureau, "Standard Grading Rules for Southern Pine Lumber."
 - 5. WCLIB: West Coast Lumber Inspection Bureau, Standard No. 17, "Grading Rules for West Coast Lumber."
 - 6. WWPA: Western Wood Products Association, "Western Lumber Grading Rules."

- C. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.
 - 1. For exposed lumber, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- D. Softwood Plywood: DOC PS 1.
- E. Hardboard: AHA A135.4.
- F. MDF: ANSI A208.2, Grade 130.
- G. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- H. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: For applications indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction, and comply with testing requirements; testing by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.
- C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants, and provide materials that do not have marks from spacer sticks on exposed face.
- D. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
- E. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - 2. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
- F. Application: Where indicated.

2.3 INTERIOR TRIM

- A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
1. Species and Grade: Eastern white pine, Premium or 2 Common; NeLMA or NLGA.
 2. Species and Grade: Idaho white, lodgepole, ponderosa, radiata, or sugar pine; 1 Common (Colonial); NLGA or WWPA.
 3. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; Premium or 2 Common (Sterling); NeLMA, NLGA, or WWPA.
 4. Species and Grade: White woods, C Select; WWPA.
 5. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr; NLGA, WCLIB, or WWPA.
 6. Species and Grade: Southern pine, B & B finish; SPIB.
 7. Species and Grade: Western red cedar, Clear Heart; NLGA, WCLIB, or WWPA.
 8. Maximum Moisture Content: 15 percent.
 9. Finger Jointing: Not allowed.
 10. Face Surface: Surfaced (smooth).
- B. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
1. Species and Grade: As indicated; NHLA.
 2. Maximum Moisture Content: 13 percent.
 3. Finger Jointing: Not allowed.
 4. Gluing for Width: Allowed.
 5. Veneered Material: Not allowed.
 6. Face Surface: Surfaced (smooth).
 7. Matching: Selected for compatible grain and color.
- C. Lumber Trim for Opaque Finish (Painted Finish):
1. Species and Grade: Eastern white pine, Finish or 1 Common; NeLMA or NLGA.
 2. Species and Grade: Idaho white, lodgepole, ponderosa, radiata, or sugar pine; D Select (Quality); NLGA or WWPA.
 3. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; Finish or 1 Common (Colonial); NeLMA, NLGA, or WWPA.
 4. Species and Grade: Douglas fir-larch or Douglas fir south, Prime or D finish; NLGA, WCLIB, or WWPA.
 5. Species and Grade: Spruce-pine-fir, 1 Common; NeLMA, NLGA, WCLIB, or WWPA.
 6. Species and Grade: Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; B Finish; NHLA.
 7. Maximum Moisture Content: 15 percent.
 8. Finger Jointing: Not allowed.
 9. Face Surface: Surfaced (smooth).
- D. Softwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA WM 4, N-grade wood moldings. Made to patterns included in WMMPA WM 12.
1. Species: As indicated.
 2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 3. Finger Jointing: Not allowed.
 4. Matching: Selected for compatible grain and color.

- E. Hardwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.
 - 1. Species: As indicated.
 - 2. Kiln-dried softwood or MDF, with exposed surfaces veneered with species indicated, may be used in lieu of solid wood.
 - 3. Maximum Moisture Content: 9 percent.
 - 4. Finger Jointing: Not allowed.
 - 5. Matching: Selected for compatible grain and color.

- F. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.
 - 1. Softwood Moldings: WMMPA WM 4, P grade.
 - a. Species: As indicated.
 - b. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 - 2. Hardwood Moldings: WMMPA HWM 2, P-grade.
 - a. Species: As indicated.
 - b. Maximum Moisture Content: 9 percent.
 - 3. Finger Jointing: Allowed.

- G. Profiles:
 - 1. **WD-[#]**: See Section 090001 “Schedule of Finishes.”

2.4 STAIRS AND RAILINGS

- A. Treads: 3/4-inch (19-mm), clear, kiln-dried, edge-glued, red oak stepping with half-round nosing.
- B. Risers: 3/4-inch (19-mm), clear, kiln-dried, edge-glued red oak stock.
- C. Interior Railing Caps: Clear, kiln-dried red oak, of pattern and dimensions indicated, either solid or laminated.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

2.6 FABRICATION

- A. Back out or kerf backs of the following members except those with ends exposed in finished work:
 - 1. Interior standing and running trim except shoe and crown molds.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch (25 mm) in nominal thickness to 1/16-inch (1.5-mm) radius and edges of lumber 1 inch (25 mm) or more in nominal thickness to 1/8-inch (3-mm) radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, too small to fabricate with proper jointing arrangements, or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 - 3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.
 - 4. Install stairs with no more than 3/16-inch (4.7-mm) variation between adjacent treads and risers and with no more than 3/8-inch (9.5-mm) variation between largest and smallest treads and risers within each flight.
 - 5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary. Stagger joints in adjacent and related standing and running trim. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - 1. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 - 2. Install trim after gypsum-board joint finishing operations are completed.

3. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 STAIR AND RAILING INSTALLATION

- A. Treads and Risers at Interior Stairs: Secure treads and risers by gluing and nailing to rough carriages.
 1. Open Stringers: Miter risers and stringer at open stringers. Extend tread over open stringers and finish with bullnose edge cut from tread stock and fitted to tread with mitered return at nosing.
- B. Railings: Fasten wood railing caps with countersunk-head wood screws.

3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces. Restore damaged or soiled areas and touch up factory-applied finishes, if any.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062023

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Architectural wood cabinets.
 - 2. Interior ornamental work.
 - 3. Plastic-laminate cabinets.
 - 4. Plastic-laminate countertops.
 - 5. Wood panel system.
 - 6. Shop finishing of interior woodwork.
- B. Related Sections include the following:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Section 090001 "Schedule of Finishes."
 - 3. Section 123640 "Stone Countertops" for stone countertops.
 - 4. Section 123661 "Solid Surfacing Countertops" for solid-surface-material countertops

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For high-pressure decorative laminate, adhesive for bonding plastic laminate, cabinet hardware and accessories and finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.

4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Initial Selection:

1. Shop-applied transparent finishes.
2. Shop-applied opaque finishes.
3. Plastic laminates.
4. PVC edge material.
5. Thermoset decorative panels.

D. Samples for Verification:

1. Lumber with or for transparent finish, not less than 5 inches (125 mm) wide by 24 inches (600 mm) long, for each species and cut, finished on 1 side and 1 edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
3. Veneer-faced panel products with or for transparent finish, 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.
4. Lumber and panel products with shop-applied opaque finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels, for each finish system and color, with ½ of exposed surface finished.
5. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
6. Thermoset decorative-panels, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish, with edge banding on 1 edge.
7. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.
8. Exposed cabinet hardware and accessories, one unit for each type and finish.

E. Product Certificates: For each type of product, signed by product manufacturer.

F. Qualification Data: For Fabricator and Installer.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers and transparent-finished wood doors that are required to be of same species as woodwork.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

- E. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

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

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue, made with binder containing no urea formaldehyde
 - 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 3. Marine-grade plywood made entirely of Douglas-fir or Western Larch. The grade of all plies of veneer is B or better, which means it may have knots, but no knotholes. The panels are sanded on both faces. The maximum core-gap size permitted is 1/8 inch. Its exposure durability rating is EXTERIOR and the glue used is a fully waterproof structural adhesive.
 - a. Face Grade: A-A.
- C. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - 1. Provide Polypropylene (PP) or Acrylonitrile butadiene styrene (ABS) edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.
 - a. Rehau, United Polymer Solutions.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
 - a. Abet Laminati, Inc.
 - b. Arborite; Division of ITW Canada, Inc.
 - c. Formica Corporation.
 - d. Lab Designs.
 - e. Lamin-Art, Inc.
 - f. Nevamar Company, LLC; Decorative Products Div.
 - g. Panolam Industries International Incorporated.
 - h. Wilsonart International; Div. of Premark International, Inc.
- E. Metal Surfacing Material: Provide the following metal surface finishes:
 - 1. Low-Pressure Decorative Metallic Laminate:
 - a. Advanced Technologies. (800)849-1320.
 - b. Chemetal Corporation, Stratford CT (203)375-5300, (203)377-5298.
 - c. Wilsonart Brand Decorative Metals, Ralph Wilson Plastics Company, (800)433-3222.

- F. Tempered Float Glass for Cabinet Shelves: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, with exposed edges seamed before tempering, 6 mm thick, unless otherwise indicated.
- G. Upholstery Fabric (**FAB-#**): Complying with NFPA 701 and ASTM E 84 for Class I materials, and the following:
 - 1. Width: 56 inches.
 - 2. 100,000 double rubs.
 - 3. Products: Reference Section 090001 "Schedule of Finishes.
- H. Upholstery Fabric Cushion: Foam cushion backing, complying with Oklahoma State Building Code requirements for Class I interior finish materials and having the following surface-burning characteristics when tested per ASTM E 84 for 30 minutes with no evidence of significant combustion:
 - 1. Flame Spread: 25.
 - 2. Smoke Developed: 450.
 - 3. Thickness: 2 inches thick, unless otherwise indicated on the Drawings.

2.2 FIRE-RETARDANT-TREATED MATERIALS:

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
 - 2. For items indicated to receive a stained or natural finish, use organic resin chemical formulation.
 - 3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.

2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."

- B. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 - 1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
- C. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- D. Concealed (European Type) Hinges: Clip170, Blum.
 - 1. Provide one pair for doors less than 4 feet high; and provide 1-1/2 pair for doors over 4 feet high.
- E. Pulls:
 - 1. Extruded Aluminum: Model #31830810 satin anodized aluminum, Richelieu.
- F. Catches: Roller catches, BHMA A156.9, B03071.
- G. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.
 - 1. Series 82 Heavy Duty Standards, with 182 Heavy Duty Brackets; Knappe & Vogt.
 - 2. Color: As selected by Architect.
- H. Drawer Slides: BHMA A156.9, B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-overtravel-extension type; zinc-plated steel ball-bearing slides.
 - a. Drawers 42 in. [1067 mm] wide or less: Accuride 3640A all ball bearing slide, with rail/bracket mount, full extension + 1 in. [25 mm] over travel, hold-in detent, and 200 lbs./pr. [91 kg] load rating. Standard finish: clear zinc
- I. Door Locks: BHMA A156.11, E07121.
- J. Drawer Locks: BHMA A156.11, E07041.
- K. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc.
- L. Adjustable Shelf Supports:
 - 1. Concealed Shelves: Two-pin locking plastic shelf rests complying with BHMA A156.9, Type B04013. Shelf clips shall be injected molded clear plastic, with a double pin engagement 32mm on center and shall have 3/4" and 1" anti-tip locking tabs as approved in AWI 400B-T-9 for premium Grade.
 - a. #282.47.402, transparent, 5mm. Hafele.
 - 2. Exposed Shelves: #282.04.113, bronze, 5mm. Hafele.

M. Bar Gaming Access Door Hardware:

1. Continuous Hinge: Stainless Steel 304 Continuous Hinge with Holes, Unfinished, 0.042" Leaf Thickness, 2" Open Width, 3/32" Pin Diameter, 1/2" Knuckle Length.
2. Locks: ANSI A156.11, Grade 2, solid brass, 6-pin cylinder, easily removable for quick and easy re-keying. Zinc lock body, 1-1/8" diameter, with steel bolts.
 - a. Door Cabinet Lock: Model #CL100PB, 1" bolt throw; Schlage, or equal.
 - b. Strike Plates: Model #CL10-354, 1/4" bar strike; Schlage, or equal. Provide strike plates for door locks.
 - c. Master key per cabinet unit, unless otherwise noted.
3. Folding Lid Support: #CD432 Folding Lid Support, steel, bright brass finish; Stanley Hardware.
4. Vent: Model #GT Metal Air Vent Grille; Doug Mockett & Company, Inc.
 - a. Size: MESH1, 4" by 12".
 - b. Finish: Matte black.

N. Glass Sliding Door Hardware: Provide complete hardware and fasteners for sliding glass doors with key lock manufactured by Knape & Vogt or equal:

1. Upper Channel: # 993, Knape & Vogt, or equal.
2. Shoe: #995, Knape & Vogt, or equal.
3. Carrier: #997, Knape & Vogt, or equal.
4. Lower Track: #999, Knape & Vogt, or equal.
5. End cap pushbutton cylinder sliding glass lock, with two keys.
6. Tempered Float Glass for Sliding Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3; with exposed edges seamed before tempering, 6 mm thick, or as indicated on Drawings.

2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. Adhesive for Bonding Plastic Laminate: Resorcinol.
 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.5 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members $\frac{3}{4}$ Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
 - 2. Edges of Rails and Similar Members More Than $\frac{3}{4}$ Inch (19 mm) Thick: $\frac{1}{8}$ inch (3 mm).
 - 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).
- D. Complete fabrication, including assembly, finishing and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.
- F. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.6 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Wood Species and Cut: As indicated.
- C. For trim items wider than available lumber, use veneered construction. Do not glue for width.
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.7 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. AWI Type of Cabinet Construction: Flush overlay.
- C. Wood Species and Cut for Exposed Surfaces:
 - 1. Species: White maple, plain sliced/plain sawn. Grain Direction: As indicated.
 - 2. Matching of Veneer Leaves: Book match.

3. Vertical Matching of Veneer Leaves: End match.
4. Veneer Matching within Panel Face: Center-balance match.
5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.
6. Comply with veneer and other matching requirements indicated for blueprint-matched paneling.

D. Semiexposed Surfaces: Provide surface materials indicated below:

1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
2. Drawer Sides and Backs: Solid-hardwood lumber, stained to match species indicated for exposed surfaces.
3. Drawer Bottoms: Thermoset decorative panels.

2.8 PLASTIC-LAMINATE CABINETS

A. Grade: Premium.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Horizontal Surfaces Other Than Tops: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: ABS edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - a. Rehau, (www.rehau.com) or Architect approved equal.

D. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - a. Edges of Plastic-Laminate Shelves: ABS edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish.
 - 1) Rehau, (www.rehau.com) or Architect approved equal.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade CLS.
2. Drawer Sides and Backs: Thermoset decorative panels.
3. Drawer Bottoms: Thermoset decorative panels.

E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.
2. **PL-[#]**: Plastic Laminate: Reference Section 090001 "Schedule of Finishes."

3. **ML-[#]:** Metal Laminate: Reference Section 090001 "Schedule of Finishes."

G. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.9 PLASTIC-LAMINATE COUNTERTOPS:

A. Quality Standard: Comply with AWI Section 400 requirements for countertops.

1. Grade: Custom.

B. Edge Treatment:

1. ABS edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish
2. Lumber edge for transparent finish matching wood species and cut on cabinet surfaces, as indicated on Drawings.

C. Type of Top: High-pressure decorative laminate complying with the following:

1. Grade: GP-50, 0.050-inch nominal thickness.
2. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with paragraph "Plastic Laminate Cabinets" above.
3. Core Material: Industrial grade medium density fiberboard (MDF) manufactured with formaldehyde-free binder and meets ANSI A208.2.
 - a. Roseburg; "Medex," medium density fiberboard.
 - b. Flakeboard; "Premier Plus MR" medium density fiberboard.
4. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.
2. **PL-[#]:** Plastic Laminate: Reference Section 090001 "Schedule of Finishes."
3. **ML-[#]:** Metal Laminate: Reference Section 090001 "Schedule of Finishes."

2.10 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.

D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing architectural woodwork not indicated to be shop finished.

- E. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.
- F. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- G. Transparent Finish:
 - 1. Grade: Premium.
 - 2. AWI Finish System: Catalyzed polyurethane.
 - 3. Staining:
 - a. **ST-1:** Match Architect's sample.
 - b. **ST-2:** Match Architect's sample.
 - c. **ST-3:** Match Architect's sample.
 - d. **ST-4:** Match Architect's sample.
 - 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 - 5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 - 6. Sheen: Gloss, 61-100 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches (2400 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- G. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with toggle bolts through metal backing or metal framing behind wall finish.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
 - 3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- J. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 064023

SECTION 066400PLASTIC PANELINGPART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Fiberglass reinforced plastic paneling.
- B. Related Sections:
 - 1. Section 090001 "Schedule of Finishes."

1.3 SUBMITTALS:

- A. General: Submit the following in accordance with General Conditions and Division 1 Specification Sections.
- B. Product Data: Submit manufacturer's descriptive literature for each type of wall panel specified.
- C. Samples: For verification purposes, submit 12-inch-square samples of each type of wall panel required, and in color and texture indicated for facing finish.
- D. Product Test Reports: Submit documentation from and based on tests performed by qualified independent testing laboratory, evidencing that wall panels comply with requirements specified for fire performance characteristics.
- E. Product Certificates: Submit documentation signed by manufacturer of wall panel certifying that products comply with specified requirements.

1.4 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: Provide wall coverings 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: 200 or less.
 - 2. Smoke Developed: 450 or less.

- B. Single Source Responsibility: Provide wall panels from a single source with resources to furnish products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Inspect materials immediately upon delivery and report defects. Damaged or deteriorated materials shall be removed from the project site.
- B. Remove panels from shipping skid and restack on solid, flat, dry surface. Do not stack on fresh concrete floors or other floors that may emit moisture.
- C. Lay panels flat. Do not store on edge.
- D. Prior to installation acclimate panels for 24 hours minimum in temperature and humidity conditions approximating the operating environment of the finished room.

PART 2 - PRODUCTS

2.1 FIBERGLASS REINFORCED PANELS:

- A. Basis-of-Design Product "**FRP-1**": Subject to compliance with requirements, provide **Fiberglass reinforced plastic (FRP) "Fire-X Glasbord" panels, with Surfaseal, Class A finish rating, unless otherwise noted, manufactured by Crane Composites, Inc.** or comparable product by one of the following:
 - 1. Marlite.
 - 2. Nudo Products, Inc.
 - 3. Panolam Industries International Inc.
- B. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319.
 - 1. FM approved.
 - 2. Panel Size: 4'-0" by 8'-0", minimum.
 - 3. Panel Thickness: .09-inch.
 - 4. Color:
 - a. **FRP-1:** Embossed Colonial White, #83.
 - b. **FRP-2:** Embossed Black, #1201.
 - c. **FRP-3:** Tennessee Timber, #003TT.
 - 5. Surface Finish: Embossed texture.
 - 6. Flexural Strength: 8.5×10^3 psi per ASTM D 790.
 - 7. Flexural Modulus: 0.35×10^6 per ASTM D 790.
 - 8. Tensile Strength: 5×10^3 psi per ASTM D 638.
 - 9. Tensile Modulus: 0.6×10^6 psi per ASTM D 638.
 - 10. Impact Strength: 30 in-lb per ASTM D 3029.

11. Barcol Hardness: 35 per ASTM D 2583.
12. Expansion Coefficient: 1.6×10^{-5} in./in./degree-F per ASTM D 3386.
13. Water Absorption: 0.16% per 24 hrs. @ 77-degrees F per ASTM D 570.
14. Taber Abrasion Resistance: 0.01 % Max Wt. Loss per Taber Test.

2.2 ACCESSORIES:

- A. Moldings and Trim: Manufacturer's standard one- or two-piece non-staining, vinyl extruded moldings. Provide standard extrusions for inside corners, outside corners, divider battens, and end caps.
 1. Color: Match plastic paneling.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- D. Adhesive: As recommended by plastic paneling manufacturer.
 1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Sealant: Single-component, mildew-resistant, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION:

- A. Substrate shall be flat, clean dry and free of dirt, dust or grease.
- B. Layout panels to ensure that seams of the panels **do not** line up with seam or joints in the substrate.

3.2 INSTALLATION:

- A. Expansion: Leave not less than 1/4 inch gap at ceiling and floor, 1/8 inch gap between wall panels for normal expansion and contraction. Allow not less than 1/8 inch gap at pipes, electrical fittings, and other projections. Fill voids with silicone sealant to complete moisture seal.

- B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 - 2. Metals: If not factory primed, clean and apply metal primer.
 - 3. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
- C. Apply 100% adhesive coverage to the back face of the FRP panel using a “crosshatch” type pattern. Ensure adhesive extends to all edges of the panel. Apply the adhesive directly to the back of the wall panel.
- D. Place panel onto substrate, using positive pressure to ensure complete mating of surfaces. Install temporary bracing to hold panel to substrate until adhesive has cured. Remove temporary bracing based on FRP manufacturer’s guidelines.
- E. Provide masking tape at edges of wall panel. Apply seam sealant to joints between FRP panels. Ensure joint is completely filled. Tool joint before sealant setup, or “skinning” period starts. Immediately remove masking tape after tooling joint.
- F. Seal all corner seams, ceiling and base junctures, and holes. Install corner moulding in accordance with manufacturer’s printed instructions.

END OF SECTION 066400

SECTION 068000

PLASTIC COMPOSITE FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes: Lightweight, seamless, fully encapsulated, composite material used to create interior, shop-fabricated, shop-finished, non-structural, architectural elements.
- B. Related Sections include the following:
 - 1. Division 06 Sections "Miscellaneous Rough Carpentry".

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
- C. Manufacturers Project References:
 - 1. Manufacturer's Project References: Submit manufacturer's list of successfully completed architectural element projects, including project name and location, name of architect, and description and quantity of elements furnished of similar type to that specified.
- D. Cleaning Instructions: Submit manufacturer's cleaning instructions.
- E. Warranty Documentation: Submit manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Manufacturer regularly engaged, for past 20 years, in manufacture of architectural elements of similar type to that specified.
- B. Mock-ups: Construct mock-ups of architectural elements for evaluation of shop fabrication and shop finishing techniques and workmanship.
 - 1. Construct mock-ups using same materials for use in the Work.
 - 2. Do not proceed until shop fabrication and shop finishing techniques and workmanship of mock-ups are approved by Architect.
 - 3. Approved Mock-ups: Standard for shop fabrication and shop finishing techniques and workmanship.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 - 1. Storage and Handling Requirements:
 - a. Store and handle materials in accordance with manufacturer’s instructions.
 - b. Keep materials in manufacturer’s original, unopened containers and packaging until installation.
 - c. Do not stack materials.
 - d. Store materials in interior, clean, dry, conditioned area.
 - e. Store materials on flat, level surface, raised above floor, with adequate support to prevent sagging.
 - f. Store materials out of direct sunlight and away from heat sources.
 - g. Keep materials from freezing.
 - h. Protect materials and finish during storage and handling to prevent damage.
 - i. Do not cut, scratch, dent, mark, or otherwise damage architectural elements when handling.
 - j. Avoid stress to architectural elements.
 - k. Prevent chipped edges and corners of architectural elements.
 - l. Wear clean, non-abrasive gloves when handling architectural elements

1.6 PROJECT CONDITIONS

- A. Install plastic composite fabrications when temperature of surfaces to be painted and ambient air temperatures are between 50 and 90 deg F (10 and 32 deg C).
- B. Install plastic composite fabrications when relative humidity is between 25 and 55 percent; and at temperatures 5 deg F (3 deg C) above the dew point.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. KMDI, Inc.,

2.2 MATERIALS

- A. Architectural Elements: “MicroLite!”
 - 1. Description: Lightweight, seamless, fully encapsulated, composite material.
 - 2. Use: Create interior, shop-fabricated, shop-finished, non-structural, architectural elements.
 - 3. Surface Burning Characteristics, ASTM E 84: Class A.
 - 4. Recycled Content: Maximum 35 percent.
 - 5. Recyclable Content: 100 percent.

2.3 FABRICATIONS

- A. Shop Fabrication: Shop fabricate architectural elements to dimensions and shapes indicated on the Drawings.
- B. Field Fabrication: As required.
- C. **PCF-(#)**: Custom repurposed faux wood panel.
 - 1. Finish: See Section 090001 - Schedule of Finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for environmental and other conditions affecting performance of work.
 - 1. Notify Architect of conditions that would adversely affect installation or subsequent use.
 - a. Do not begin installation until unacceptable conditions are corrected.

3.2 PREPARATION

- A. Install supports as required for installation of architectural elements.
- B. Clean installation area of dirt, dust, debris, and other items that could damage finish of architectural elements.
- C. Wear clean, non-abrasive gloves when preparing and installing architectural elements.
- D. Lay out architectural element components on manufacturer's packing material from shipping to protect finish of architectural elements.
- E. Do not discard manufacturer's packing material until installation is complete

3.3 INSTALLATION

- A. Install architectural elements in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Install architectural elements plumb and level, unless otherwise indicated on the Drawings.
- C. Support architectural elements securely in place.
- D. Use installation hardware furnished by manufacturer.
- E. Do not cut, scratch, dent, mark, or otherwise damage architectural elements during installation.

3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective plastic composite fabrications, where possible, to eliminate defects; where not possible to repair, replace plastic composite fabrications. Adjust for uniform appearance.

- B. Clean plastic composite fabrications on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

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 plastic composite fabrications installation. Do not scratch or damage adjacent finished surfaces.
- C. Protect plastic composite fabrications work from dirt, dust and damage during construction.

END OF SECTION 068000

SECTION 071700BENTONITE WATERPROOFINGPART 1 - GENERAL1.1 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. Bentonite waterproofing.
 2. Molded-sheet drainage panels.
- B. Related Requirements:
1. Section 312000 "Earth Moving" for excavating and backfilling.
 2. Section 315000 "Excavation Support and Protection" for permanent below-grade support systems that receive blind-side waterproofing.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
1. Include construction details, material descriptions, and installation instructions.
- B. Shop Drawings: Include installation details for waterproofing, penetrations, and interface with other work.
- C. Samples: For each of the following products, in sizes indicated:
1. Waterproofing: 6 inches (150 mm) square.
 2. Protection Course: 6 inches (150 mm) square.
 3. Molded-Sheet Drainage Panels: 6 inches (150 mm) square.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of waterproofing material.
- B. Preconstruction Test Reports: For water samples taken at Project site along with recommendations resulting from these tests.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 QUALITY ASSURANCE

- A. Mockups: Build mockups to set quality standards for fabrication and installation.
 - 1. Build mockup of installation on typical vertical surfaces 10 sq. ft. (0.9 sq. m) in size.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing: Engage a qualified testing agency to perform preconstruction testing on ground water.
 - 1. Obtain water samples from Project site at approximate locations where waterproofing will be installed and test for acids, alkalis, brine, or other contaminants that may inhibit performance of waterproofing materials.
 - 2. Comply with waterproofing manufacturer's written instructions for testing.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit bentonite waterproofing to be installed according to manufacturer's written instructions and warranty requirements.
 - 1. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.
 - 2. Do not place bentonite clay products in panel or composite form on damp surfaces unless such practice is approved in writing by manufacturer.

1.9 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system 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 GEOTEXTILE/BENTONITE SHEETS

- A. Polyethylene-Lined Geotextile/Bentonite Sheet: Minimum of 1.0 lb/sq. ft. (5 kg/sq. m) of bentonite clay granules between two layers of geotextile fabric, heat-fused together; and with a low-permeability polyethylene geomembrane bonded to one surface.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Carlisle Coatings & Waterproofing; CCW MiraCLAY GM.
 - b. CETCO, a subsidiary of AMCOL International Corp; Voltex DS.
 - c. Mapei; Mapeproof.

2. Grab Tensile Strength: 95 lbf (422 N) according to ASTM D 4632.
3. Puncture Resistance: 100 lbf (445 N) according to ASTM D 4833.
4. Vapor Permeance: 0.03 perms according to ASTM E 96/E 96M.

2.2 PROTECTION COURSE

- A. Protection Course: Protection mat of type and thickness as recommended in writing by waterproofing manufacturer for each Project condition.
 1. Adhesive: As recommended in writing by waterproofing manufacturer.

2.3 INSULATION DRAINAGE PANELS

- A. Insulation Drainage Panels, General: Comply with Section 072100 "Thermal Insulation" for general building insulation, including insulation drainage panels.

2.4 ACCESSORIES

- A. Granular Bentonite: Sodium bentonite clay containing a minimum of 90 percent montmorillonite (hydrated aluminum silicate), with a minimum of 90 percent passing a No. 20 (0.85-mm) sieve.
- B. Bentonite Mastic: Bentonite compound of trowelable consistency, specifically formulated for application at joints and penetrations.
- C. Bentonite Tubes: Manufacturer's standard 2-inch- (50-mm-) diameter, water-soluble tube containing approximately 1.5 lb/ft. (2.2 kg/m) of granular bentonite; hermetically sealed; designed specifically for placing on wall footings at line of joint with exterior base of wall.
- D. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
- E. Plastic Protection Sheet: Polyethylene sheeting according to ASTM D 4397; thickness as recommended in writing by waterproofing manufacturer to suit application but at least 6 mils (0.15 mm) thick.
- F. Cement Grout Patching Material: Grout mix compatible with substrate being patched and recommended in writing by waterproofing manufacturer.
- G. Masonry Fasteners: Case-hardened nails or hardened-steel, powder-actuated fasteners. Depending on manufacturer's written requirements, provide 1/2- or 1-inch- (13- or 25-mm-) diameter washers under fastener heads.
- H. Sealants: As recommended in writing by waterproofing manufacturer. Comply with requirements specified in Section 079200 "Joint Sealants."
- I. Tapes: Waterproofing manufacturer's recommended waterproof tape for joints between sheets, membranes, or panels.
- J. Adhesive: Waterproofing manufacturer's water-based adhesive used to secure waterproofing to both vertical and horizontal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations and other conditions affecting performance of bentonite waterproofing.
- B. Examine bentonite materials before installation. Reject materials that have been prematurely exposed to moisture.
- C. Verify that substrate is complete and that work that will penetrate waterproofing is complete and rigidly installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions.
- B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- C. Horizontal Concrete Surfaces: Remove debris, standing water, oily substances, mud, and similar substances that could impair the bonding ability of concrete or the effectiveness of waterproofing. Fill voids, cracks greater than 1/8 inch (3 mm), honeycomb areas, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- D. Excavation Support and Protection System: If water is seeping, use plastic protection sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces 1/8 inch (3 mm) wide or wider with wood, metal, concrete, or other appropriate filling material. Cover or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

3.3 INSTALLATION, GENERAL

- A. Prepare substrates, voids, cracks, and cavities; and install waterproofing and accessories according to manufacturer's written instructions.
 - 1. Before installing, verify the correct side of waterproofing that shall face substrate surface.
 - 2. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for bentonite tubes and mastic.
 - 3. Apply bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
 - 4. Prime concrete substrates. Primer may be omitted on concrete surfaces that comply with manufacturer's written requirements for dryness, surface texture, and freedom from imperfections.
- B. Apply bentonite tubes continuously on footing against base of wall to be waterproofed.
- C. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts.
- D. Install protection course before backfilling or placing overburden when recommended in writing by waterproofing manufacturer.

3.4 GEOTEXTILE/BENTONITE SHEET INSTALLATION

- A. Install a continuous layer of waterproofing sheets directly against surface to be waterproofed. Lap ends and edges a minimum of 4 inches (100 mm) on horizontal and vertical substrates unless otherwise indicated. Stagger end joints between sheets a minimum of 24 inches (600 mm). Fasten seams by stapling to adjacent sheet or nailing to substrate.
- B. Below Structural Slabs-on-Grade: Place waterproofing sheets on compacted substrate with ends and edges lapped and stapled.
 - 1. Install a layer of waterproofing sheets under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of 8 inches (200 mm) up or beyond perimeter slab forms.
- C. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets horizontally against wall. Secure with masonry fasteners spaced according to manufacturer's written instructions. Extend to bottom of footing, grade beam, or wall, and secure.
 - 1. Termination at Grade: Extend waterproofing sheets to within 12 inches (300 mm) of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.
- D. Excavation Support and Protection (Permanent Shoring): Encase tieback heads, rods, nuts, and plates according to waterproofing manufacturer's written instructions for each configuration.
 - 1. Install a layer of waterproofing sheets, with ends and edges lapped and nailed to shoring. Cover waterproofing with plastic protection sheets if needed for protection from precipitation; remove plastic sheets before placing concrete.
 - 2. Inspect and repair waterproofing after reinforcing steel has been placed. Coordinate and control concrete placement to avoid damage to waterproofing.

3.5 INSULATION DRAINAGE PANEL INSTALLATION

- A. Install over waterproofed surfaces. Cut and fit to within 3/4 inch (19 mm) of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed waterproofing installation before covering with other construction, and provide written report stating that installation complies with manufacturer's written instructions.

1. Remove and replace applications of bentonite waterproofing where inspection indicates that it does not comply with specified requirements.

END OF SECTION 071700

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
1. Concealed building insulation.
 2. Perimeter foundation insulation.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 07 Section "Penetration Firestopping" for firestopping systems and fire-resistance-rated joint sealants.
 2. Division 07 Section "Joint Firestopping" for firestopping systems and fire-resistance-rated joint sealants.
 3. Section 075416 "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Roofing" for insulation specified as part of roofing construction.
 4. Division 09 Section "Gypsum Board" for sound attenuation insulation installed as part of gypsum board construction.

1.3 DEFINITIONS:

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 SUBMITTALS:

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of insulation product specified.
- C. Samples of exposed insulation for initial selection in the form of actual units or sections of units showing the full range of colors available for each type of exposed insulation indicated.
- D. Product test reports from and based on tests performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.

- E. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence compliance of foam-plastic insulations with building code in effect for Project.

1.5 QUALITY ASSURANCE:

- A. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products complying with requirements indicated without delaying the Work.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated on Drawings or specified elsewhere in this Section as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

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

2.2 FOAM-PLASTIC BOARD INSULATION:

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Available Manufacturers:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.
 - d. Pactiv Building Products Division.
 - e. Or equal.
2. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m), unless otherwise indicated.
3. R-Value: R-values are expressed in ft²•h•°F/Btu. RSI values are expressed in m²°C/W. R-value determined by ASTM C518.

| | <u>Board Thickness</u> | <u>R-Value (RSI)</u> |
|----|------------------------|----------------------|
| a. | 1.0" (25mm) | 5.0 (0.88) |
| b. | 1.5" (38mm) | 7.5 (1.32) |
| c. | 2.0" (50mm) | 10.0 (1.76) |
| d. | 2.4" (61mm) | 12.0 (2.11) |
| e. | 2.5" (64mm) | 12.5 (2.2) |
| f. | 3.0" (75mm) | 15 (2.64) |

2.3 ADHESIVE, GAP, VOID AND PENETRATION INSULATION FILLER:

- A. Spray Polyurethane Foam Insulation Gap Filler: Provide one of the following:
1. GREAT STUFF PRO™ Gaps & Cracks Insulating Foam Sealant; Dow.
 2. DAP KWIK FOAM Polyurethane Insulating Foam Sealant; DAP Products, Inc.
 3. “The Insulator”, Gap Filler Pro Series; Arctic Foam Products.
 4. Or equal.

2.4 GLASS-FIBER BLANKET INSULATION:

- A. Available Manufacturers:
1. CertainTeed Corporation.
 2. Guardian Fiberglass, Inc.
 3. Johns Manville.
 4. Knauf Fiber Glass.
 5. Owens Corning.
- B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistance indicated:

| | <u>Thickness</u> | <u>R-Value</u> |
|----|----------------------|----------------|
| 1. | 2-1/2 inches (64 mm) | 8 |
| 2. | 3-1/2 inches (89 mm) | 11 |
| 3. | 6-1/4 inches (159mm) | 19 |

2.5 SLAG-WOOL-FIBER/ROCK-WOOL-FIBER BLANKET INSULATION:

- A. Available Manufacturers:

1. Fibrex Insulations Inc.
2. Owens Corning.
3. Roxul.
4. Thermafiber.
5. Or equal.

- B. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- C. Where slag-wool-fiber/rock-wool-fiber blanket insulation, or sound attenuation insulation is indicated by the following thicknesses, provide blankets in batt form with thermal resistance indicated:

1. Nominal density of 2.5 lb/cu. ft.
2. R-Value: 3.7 per inch of thickness.

2.6 AUXILIARY INSULATING MATERIALS:

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 EXAMINATION:

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

3.2 PREPARATION:

- A. Clean substrates of substances harmful to insulations, including removing projections that interfere with insulation attachment.

- B. Close off openings in cavities receiving poured-in-place insulation to prevent escape of insulation. Provide bronze or stainless-steel screens (inside) where openings must be maintained for drainage or ventilation.

3.3 INSTALLATION, GENERAL:

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, unsoiled, and has not been exposed at any time to ice and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Apply single layer of insulation to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.
- E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION:

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between closed-cell (nonbreathing) insulation units by applying spray foam gap insulation. Fill voids in completed installation with spray foam gap insulation.
- C. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:
 - 1. Use blanket widths and lengths that fill cavities formed by framing members. Where more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - 2. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION:

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 PROTECTION:

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

END OF SECTION 072100

SECTION 072413 POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Exterior insulation and finish system (EIFS) with drainage, applied over glass-mat gypsum sheathing.
- B. Related Sections include the following:
 - 1. Division 05 Section "Cold-Formed Metal Framing" for steel stud framing behind system.
 - 2. Division 06 Section "Sheathing" for glass-mat gypsum sheathing behind EIFS system.
 - 3. Division 07 Section "Sheet Metal Flashing and Trim" for metal flashings and counterflashings.
 - 4. Division 07 Section "Joint Sealants" for sealing joints in system with elastomeric joint sealants.

1.3 DEFINITIONS:

- A. Class PB Exterior Insulation and Finish System (EIFS) is defined by ASTM PS 49 as a "nonload bearing, exterior wall cladding system that consists of an insulation board attached either adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a texture protective finish coat."
- B. Systems refer to Class PB EIFS.
- C. System manufacturer refers to EIFS manufacturer.

1.4 SUBMITTALS:

- A. Product Data: For each component of EIFS specified.
- B. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- C. Samples for Initial Selection: Manufacturer's color charts and small-scale samples consisting of units or sections of units showing the full range of colors, textures, and patterns available for each finish choice indicated.

- D. Samples for Verification: 24-inch-square panels for each finish, color, texture, and pattern specified. Prepare samples using same tools and techniques intended for actual work.
- E. Installer Certificates: Signed by system manufacturer certifying that installers comply with specified requirements.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and address of architects and owners, and other information specified.
- G. Material Certificates: Signed by manufacturers or a third-party agency approved by system manufacturer certifying that each of the following items complies with requirements:
 - 1. Insulation.
- H. Product Test Reports: Indicate compliance of proposed EIFS with physical property requirements specified in "Performance Requirements" Article based on comprehensive testing of current products by a qualified testing and inspecting agency.
- I. Research/Evaluation Reports: Evidence of EIFS compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

1.5 QUALITY ASSURANCE:

- A. Installer Qualifications: Shall be knowledgeable in the proper installation of the FM system and shall be experienced and competent in the installation of Exterior Insulation and Finish Systems.
- B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- C. Source Limitations: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by EIFS manufacturer as compatible with other system components.
- D. Fire-Test-Response Characteristics: Provide system assemblies and components with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting agency.
 - 1. Flame Spread of Insulation Board and Finish Coats: 25 or less when tested individually per ASTM E 84.
 - 2. Smoke Developed of Insulation Board and Finish Coats: 450 or less when tested individually per ASTM E 84.
 - 3. The adhesives and coatings shall have a Flame Spread index not exceeding 20 and a Smoke Developed index not exceeding 10.
 - 4. Ignitability Characteristics: NFPA 268; passed.

- E. Mockups: Before installing system, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work:
 - 1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of the dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting fabrication of work.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. Protect mockups from weather and from construction activities. Brace mockups to resist design wind loads and provide waterproof coverings for construction materials not intended to be permanently exposed to the weather.
 - b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials in original, unopened packages with manufacturer's labels intact and clearly identifying products.

- B. Store materials inside and under cover; keep them dry and protected from the weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - 1. Stack insulation board flat and off the ground.
 - 2. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install system when ambient outdoor air and substrate temperatures are 40 deg F and falling unless temporary protection and heat are provided to maintain ambient temperatures above 40 deg F during installation of wet materials and until they have dried thoroughly and become weather resistant, but for at least 24 hours after installation.

1.8 COORDINATION AND SCHEDULING:

- A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealers, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind EIFS.

1.9 WARRANTY:

- A. **Manufacturer's Special Warranty:** Manufacturer agrees to repair or replace components of EIFS-clad drainage-wall assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.
 - 2. Warranty coverage includes the following components of EIFS-clad drainage-wall assemblies:
 - a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
 - b. Insulation installed as part of EIFS.
 - c. Insulation adhesive.
 - d. EIFS accessories, including trim components and flashing.
 - e. Water-resistive coatings.
 - f. EIFS drainage components.
 - 3. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. **Basis-of-Design Product:** The design for EIFS is based on **Outsulation System, Plus MD; Dryvit Systems, Inc.**, Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
 - a. Parex, Inc.
 - b. Pleko Systems International, Inc.
 - c. Senegy Inc.; SKW-MBT Construction Chemicals.
 - d. Sonneborn, Div. of ChemRex, Inc.; SKW-MBT Construction Chemicals.
 - e. Sto Corp.

2.2 PERFORMANCE REQUIREMENTS:

- A. EIFS Performance: Comply with ASTM E 2568 and with the following:
 - 1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
 - 2. System Fire Performance: Full-scale multistory fire test.
 - 3. Structural Performance: EIFS assembly and components shall comply with ICC-ES AC219 when tested according to ASTM E 2568.
 - a. Wind Loads: Uniform pressure as indicated on Drawings.
 - 4. Impact Performance: ASTM E 2568, Standard resistance. Ultra-high impact resistant to with-in 8 feet of finish grade surface.
 - 5. Bond Integrity: Free from bond failure within EIFS components or between EIFS and substrates, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - 6. Abrasion Resistance of Finish Coat: Sample consisting of 1-inch-25.4-mm- thick EIFS mounted on 1/2-inch-12.7-mm- thick gypsum board; cured for a minimum of 28 days and shows no cracking, checking, or loss of film integrity after exposure to 528 quarts 500 L of sand when tested according to ASTM D 968, Method A.
 - 7. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch 50.8-by-50.8-mm clean glass substrate; cured for 28 days and shows no growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274.

2.3 MATERIALS:

- A. Compatibility: Provide substrates, adhesive, board insulation, reinforcing meshes, base- and finish-coat materials, sealants, and accessories that are compatible with one another and approved for use by system manufacturer for Project.
- B. Colors, Textures, and Patterns of Finish Coats: Match colors and textures indicated by referencing system manufacturer's standard designations for these characteristics:
 - 1. Colors:
 - a. **EIFS-#):** Match Architect's sample.
 - 1) Texture: Sandpebble Fine - DPR; Dryvit.
 - 2) Color: Match Architect's sample.
 - 3) See Section 090001 Schedule of Finishes.
- C. Metal Framing: Comply with requirements in Division 05 Section "Cold-Formed Metal Framing."
- D. Sheathing: Comply with requirements in Division 06 Section "Sheathing."

- E. Primer-Sealer: System manufacturer's standard substrate conditioner designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
- F. Air/Water-Resistive Barrier Components:
 - 1. Dryvit Backstop® NT: A flexible, polymer-based noncementitious water-resistive coating available in Texture and Smooth.
 - 2. Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive available in rolls 102 mm (4 in) wide by 91 m (100 yds) long.
- G. Flexible-Membrane Flashing: Cold-applied, self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- H. Flashing Materials: Used to protect substrate edges at terminations.
 - 1. Liquid Applied: An extremely flexible water-based polymer material, ready for use.
 - a. AquaFlash and AquaFlash Mesh.
 - 2. Sheet Type: Shall be Flashing Tape and Surface Conditioner.
 - a. Dryvit Flashing Tape™: A high density polyethylene film backed with a rubberized asphalt adhesive available in rolls 102 mm (4 in), 152 mm (6 in) and 229 mm (9 in) wide by 23 m (75 ft) long.
 - b. Dryvit Flashing Tape Surface Conditioner™: A water-based surface conditioner and adhesion promoter for the Dryvit Flashing Tape.
- I. Adhesive for Application of Insulation: System manufacturer's standard formulation designed for indicated use, compatible with substrate, and complying with the following requirements:
 - 1. Factory-mixed formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by system manufacturer.
 - 2. Dryvit Genesis FM.
- J. Molded-Polystyrene Board Insulation: Rigid, cellular thermal insulation formed by expansion of polystyrene resin beads or granules in a closed mold. Comply with system manufacturer's requirements, ASTM C 578 for Type I, and "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for more stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 - 1. Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 - 2. Provide insulation in boards in thickness indicated but not less than 2 inches and not more than 4 inches or less than that allowed by ASTM PS 49.
 - 3. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E 84.

4. Insulation Board: Expanded Polystyrene meeting Dryvit Specification for Insulation Board, DS131.
 5. The insulation board shall be manufactured by a board supplier listed by Dryvit Systems, Inc.
 6. Form cornice and trim molding in the profiles indicated on the drawings.
- K. Reinforcing Mesh: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other system materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:
1. Standard Reinforcing Mesh: Not less than 4.3 oz./sq. yd.
 2. Impact-Resistant Reinforcing Mesh: Not less than 20.5 oz./sq. yd.
 3. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd.
 4. Detail Reinforcing Mesh: Not less than 4.3 oz./sq. yd.
 5. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd.
- L. Base-Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:
1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use indicated.
 2. Dryvit Genesis FM.
- M. Primer: System manufacturer's standard factory-mixed elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- N. Finish-Coat Materials: System manufacturer's standard mixture complying with the following requirements for material composition and method of combining materials:
1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
- O. Water: Potable.
- P. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with system manufacturer's written requirements, manufactured from vinyl plastic and complying with ASTM C 1063.
- Q. Drainage Track: UV treated PVC "J" channel perforated with weep holes, complying with ASTM D 1784 and ASTM C 1063. Drainage track usage is limited to the base of the system at finished grade level. All other horizontal terminations shall utilize the Dryvit Drainage Strip as shown in Outsulation Plus MD Installation Details, DS110. Shall be one of the following:
1. Starter Trac STWP – without drip edge by Plastic Components, Inc.
 2. Starter Trac STDE – with drip edge by Plastic Components, Inc.
 3. Universal Starter Track by Wind-lock Corporation
 4. Sloped Starter Strip with Drip by Vinyl Corp.

- R. Dryvit Drainage Strip™: A corrugated plastic sheet material, which provides drainage.

2.4 MIXING:

- A. General: Comply with system manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by system manufacturer. Mix materials in clean containers. Use materials within time period specified by system manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of system. Proceed with installation of system only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Protect contiguous work from moisture deterioration and soiling caused by application of systems. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect system, substrates, and wall construction behind them from inclement weather during installation. Prevent infiltration of moisture behind system and deterioration of substrates.
- C. Prepare and clean substrates to comply with system manufacturer's written requirements to obtain optimum bond between substrate and adhesive for insulation.
 - 1. Apply primer-sealer over gypsum sheathing substrates to protect sheathing from degradation.

3.3 INSTALLATION:

- A. Comply with ASTM PS 49 and system manufacturer's written instructions for installation of system as applicable to each type of substrate indicated.
 - 1. Comply with Dryvit Outsulation Plus MD System Application Instructions, DS218.
- B. Apply trim accessories at perimeter of system, at expansion joints, and elsewhere, as indicated. Use drip screed at bottom edge of system, unless otherwise indicated.

- C. Adhesively attach insulation to comply with ASTM PS 49, system manufacturer's written requirements, and the following:
1. Cementitious Adhesive:
 - a. Notched Trowel Method
 - 1) With a notched trowel, 9.5 mm (3/8 in) wide, 12.7 mm (1/2 in) deep notches spaced 38 mm (1 1/2 in) apart, apply the adhesive mixture to the backside of the insulation board. Holding the trowel at a 45° angle, apply firm pressure to the insulation board in order to scrape the excess adhesive from between the adhesive beads. **NOTE: Apply the adhesive so that the ribbons run vertically when the insulation board is placed on the wall.**
 2. Position the insulation board horizontally on the substrate. Press the board gently to the substrate and slide it into position. Apply firm pressure over the entire surface of the insulation board to ensure uniform contact and high initial grab.
 3. Install subsequent rows of insulation board in a running bond pattern (vertical joints staggered).
 4. Allow adhered insulation to remain undisturbed for period recommended by system manufacturer, but not less than 24 hours, before beginning rasping and sanding insulation, and applying base coat and reinforcing mesh.
 5. Interlock ends at internal and external corners.
 6. Abut boards tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between insulation boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
 7. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
 8. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch.
 9. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at features to less than 3/4 inch.
 10. Interrupt insulation for expansion joints where indicated.
 11. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
 12. Treat exposed edges of insulation board as follows:
 - a. Wrap edges after installing insulation board and before applying field-applied reinforcing mesh.
 - b. Wrap mesh of width required to extend not less than 2-1/2 inches onto substrate behind insulation board, cover insulation board edge, and extend not less than 2-1/2 inches onto insulation board face.

- c. Wrap edges of insulation board, except those forming substrates of sealant joints, by encapsulating with base coat, reinforcing mesh, and finish coat.
 - d. Wrap edges of insulation board forming substrates of sealant joints within system or between system and other work by encapsulating with base coat and reinforcing mesh.
- D. Install trim accessories at locations indicated according to system manufacturer's written instructions.
- E. Install expansion joints at locations indicated, where required by system manufacturer, and as follows:
 - 1. Where expansion joints are indicated in substrates behind EIFS.
 - 2. Where EIFS adjoins dissimilar substrates, materials, and construction.
 - 3. Where wall height changes or building height changes.
 - 4. At floor lines.
- F. Apply base coat to exposed surfaces of insulation in minimum thickness specified by system manufacturer.
- G. Embed reinforcing mesh of type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM PS 49 and system manufacturer's written requirements. Do not lap reinforcing mesh within 8 inches of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - 1. Standard reinforcing mesh, unless otherwise indicated.
 - 2. Install impact resistant mesh to within 8'-0" of finish grade.
- H. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch-wide strip reinforcing mesh at both inside and outside corners, unless base layer of mesh is lapped not less than 4 inches on each side of corners.
 - 1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches wide.
 - 2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- I. Apply primer over dry base coat according to system manufacturer's written instruction.
- J. Apply finish coat over dry primer, maintaining a wet edge at all times for uniform appearance, in thickness required by system manufacturer to produce a uniform finish of color and texture matching approved sample.

3.4 FIELD QUALITY CONTROL:

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. As stipulated in Ch. 17 of the IBC.
 - 2. According to ICC-ES AC235.
- B. EIFS will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTING:

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive system coatings.
- B. Provide final protection and maintain conditions, in a manner acceptable to Installer and system manufacturer, that ensure system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 072413

PART 1 – GENERAL

1.1 SUMMARY

A. Products Supplied Under This Section

1. Vapor Retarder, seam tape, mastic, pipe boots for installation under concrete slabs.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Cast-in-place Concrete - Section 03 30 00
- B. Concrete Forming and Accessories - Section 03 20 00
- C. Earthwork for Building Construction - Section 31 23 11

1.3 REFERENCES, latest editions of the following:

A. American Society for Testing and Materials (ASTM)

- | | | |
|----|--------------------|---|
| 1. | ASTM E 96/ E96M | Standard Test Methods for Water Vapor Transmission of Materials |
| 2. | ASTM E 154 | Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs |
| 3. | ASTM E 1643 | Standard Practice for Selection, Design, Installation and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs |
| 4. | ASTM E 1745 | Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs |

B. American Concrete Institute (ACI)

1. ACI 302.2R, Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.4 SUBMITTALS

A. Quality Control / Assurance

1. Comply with Section 01 33 00 – Submittal Procedures.
2. Independent laboratory test results showing compliance with ASTM & ACI Standards.

3. Manufacturer's samples, literature
 4. Manufacturer's installation instructions for placement, seaming and pipe boot installation
- B. Delivery, Storage, and Handling
1. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
 2. Store materials in a clean dry area in accordance with manufacturer's instructions.
 3. Stack membrane on smooth ground or wood platform to eliminate warping.
 4. Protect materials during handling and application to prevent damage or contamination.
 5. Ensure membrane is stamped with manufacturer's name, product name and membrane thickness at intervals of no more than 85" (220 cm).
- C. Environmental requirements
1. Product not intended for uses subject to abuse or permanent exposure to the elements.
 2. Do not apply on frozen ground.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. Vapor Retarder (Performance-Based Specifications)
1. Vapor Retarder must have the following qualities at minimum and meet floor finish manufacturer's warranty requirements.
 - a. Water Vapor Retarder ASTM E1745: Meets or exceeds Class A
 - b. Maximum Permeance ASTM E96: 0.01 Perms or as required to meet Flooring Manufacturer's Warranties.
 - c. Tensile Strength ASTM E154, Section 9: not less than 45 LBS. Force/Inch
 - d. Puncture Resistance ASTM D1709, Method B.
 - e. Thickness of Retarder (plastic) ACI 302.1R-96: Not less than 15 mils
 - f. Material: Virgin Polyethylene or Polyolefin

2. Vapor Retarder Products, may be by one of the following manufacturers or an approved equal, as long as the requirements above are met.
 - a. Epro, <http://eproserv.com>
 - b. Fortifiber, <http://www.fortifiber.com>
 - c. Stego Industries, <http://www.stegoindustries.com>
 - d. W.R. Meadows, <http://www.wrmeadows.com>
 - e. Raven Industries, <http://www.vaporblock.com>
 - f. Reef Industries, <http://www.reefindustries.com>
 - g. Insulation Solutions, <http://www.insulationsolution.com>

2.2 ACCESSORIES

A. Seam Tape

1. Tape must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

B. Vapor Proofing Mastic

1. Mastic must have the following qualities:
 - a. Water Vapor Transmission Rate ASTM E 96 0.3 perms or lower

C. Pipe Boots

1. Construct pipe boots from vapor Retarder material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive membrane. Ensure compaction requirements have been completed and geotechnical firm has confirmed compaction requirements have been met. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Prepare surfaces in accordance with manufacturers instructions.

3.3 INSTALLATION

A. Install Vapor Retarder:

1. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643.
 - a. Unroll Vapor Retarder with the longest dimension parallel with the direction of the pour.
 - b. Lap Vapor Retarder over footings and seal to foundation walls.
 - c. Overlap joints 6 inches and seal with manufacturer's tape.
 - d. Seal all penetrations (including pipes) per manufacturer's instructions.
 - e. No penetration of the Vapor Retarder is allowed except for reinforcing steel and permanent utilities.
 - f. Repair damaged areas by cutting patches of Vapor Retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 072600

SECTION 072726

FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Vapor-retarding, fluid-applied air barriers.

B. Related Requirements:

- 1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

- A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

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

Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
 - 2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 3. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.
- B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
 - 1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build integrated mockups of exterior wall assembly 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
 - b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
 - c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups.
- B. Mockup Testing: Air-barrier assemblies shall comply with performance requirements indicated, as evidenced by reports based on mockup testing by a qualified testing agency.
 - 1. Air-Leakage-Location Testing: Mockups will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
 - 2. Air-Leakage-Volume Testing: Mockups will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
 - 3. Adhesion Testing: Mockups will be tested for required air-barrier adhesion to substrate according to ASTM D 4541.
 - 4. Notify Architect seven days in advance of the dates and times when mockups will be tested.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 - 1. Protect substrates from environmental conditions that affect air-barrier performance.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. 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.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR RETARDING

- A. High-Build, Vapor-Retarding Air Barrier: Synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 40 mils (1.01 mm) or thicker over smooth, void-free substrates.
 - 1. Synthetic Polymer Type:
 - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Carlisle Coatings & Waterproofing Inc.
 - 2) GCP Applied Technologies Inc. (formerly Grace Construction Products).
 - 3) Henry Company.
 - 4) Hohmann & Barnard, Inc.
 - 5) Sto Corp.
 - 6) W.R. Meadows, Inc.

2. Physical and Performance Properties:
 - a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Maximum 0.1 perm (5.8 ng/Pa x s x sq. m); ASTM E 96/E 96M, Desiccant Method.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C.
 - d. Adhesion to Substrate: Minimum 16 lbf/sq. in. (110 kPa) when tested according to ASTM D 4541.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 90 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187 inch (0.5 mm) thick, and Series 300 stainless-steel fasteners.
- D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Pecora Corporation.
 - d. Tremco Incorporated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 3. Verify that substrates are visibly dry and free of moisture.
 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge isolation joints, expansion joints, and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate.
 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.

4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply transition strip or preformed silicone extrusion so that a minimum of 3 inches (75 mm) of coverage is achieved over each substrate. Maintain 3 inches (75 mm) of full contact over firm bearing to perimeter frames, with not less than 1 inch (25 mm) of full contact.
 1. Transition Strip: Roll firmly to enhance adhesion.
 2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch- (150-mm-) wide, transition strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness not less than 40 mils (1.0 mm), applied in one or more equal coats.
 - 2.
- C. Do not cover air barrier until it has been tested and inspected by testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Air-barrier dry film thickness.
 3. Continuous structural support of air-barrier system has been provided.
 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 5. Site conditions for application temperature and dryness of substrates have been maintained.
 6. Maximum exposure time of materials to UV deterioration has not been exceeded.
 7. Surfaces have been primed, if applicable.
 8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 9. Termination mastic has been applied on cut edges.
 10. Strips and transition strips have been firmly adhered to substrate.
 11. Compatible materials have been used.
 12. Transitions at changes in direction and structural support at gaps have been provided.

13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, chamber pressurization or depressurization with smoke tracers.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate according to ASTM E 783 or ASTM E 2357.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate according to ASTM D 4541 for each 600 sq. ft. (56 sq. m) of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 072726

SECTION 074210 CONTINUOUS INSULATION WALL PANEL SUPPORT SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES:

- A. Exterior wall panel support system used with continuous insulation panels.

1.2 RELATED REQUIREMENTS:

- A. Section 033000 – Cast-in-Place Concrete: Concrete wall substrate.
- B. Section 054000 – Cold-Formed Metal Framing: Wall panel substrates support framing.
- C. Section 061600 – Sheathing.
- D. Section 072726 – Fluid-Applied Membrane Air Barriers: Air and moisture barrier required as part of fiber-cement siding wall panel assembly.
- E. Section 076200 – Sheet Metal Flashing and Trim: Field formed flashings and other sheet metal work.
- F. Section 079200 – Joint Sealant: Perimeter sealant.

1.3 REFERENCE STANDARDS:

- A. AAMA - American Architectural Manufacturers Association (www.aamanet.org).
 - 1. AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure; 2005.
- B. ASCE American Society of Civil Engineers (www.asce.org)
 - 1. ASCE 7 – Minimum Design Loads for Buildings and Other Structures; 2010.
- C. ASTM International (American Society for Testing and Materials; www.astm.org)
 - 1. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2011
 - 2. ASTM C203 - Standard Test Methods for Breaking Load and Flexural Properties of Block-Type Thermal Insulation; 2012
 - 3. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board; 2012
 - 4. ASTM C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions; 2012.
 - 5. ASTM C356 – Standard Test Method for Linear Shrinkage of Preformed High-Temperature Thermal Insulation Subjected to Soaking Heat; 2010.
 - 6. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
 - 7. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2012.
 - 8. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2010.

9. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw- Attached Gypsum Panel Products; 2009.
 10. ASTM C1104 - Standard Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation; 2013.
 11. ASTM C1177 – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2008.
 12. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2013.
 13. ASTM C1363 - Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus; 2011
 14. ASTM C1396 – Standard Specification for Gypsum Board; 2013
 15. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics; 2010.
 16. ASTM D570 – Standard Test Method for Water Absorption of Plastics; 2010.
 17. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 2010.
 18. ASTM D696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C with a Vitreous Silica Dilatometer; 2008.
 19. ASTM D792 – Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement; 2008.
 20. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics; 2010.
 21. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics; 2008.
 22. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics; 2009.
 23. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging; 2009.
 24. ASTM D2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor; 2013.
 25. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics; 2012.
 26. ASTM D4385 - Standard Practice for Classifying Visual Defects in Thermosetting Reinforced Plastic Pultruded Products; 2010.
 27. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials; 2013.
 28. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials; 2012.
 29. 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; 2004.
 30. ASTM E 330 - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference; 2010.
 31. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference; 2009
- D. NFPA – National Fire Protection Association (www.nfpa.org)
1. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non- Load-Bearing Wall Assemblies Containing Combustible Components; 2012.
- E. PS - Voluntary Product Standard; National Institute of Standards and Technology (NIST).
1. PS-1 – Structural Plywood; 2007.
- F. UL – United Laboratories (www.ul.com)
1. UL 94 - Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances; 2013.
 2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; 2008

1.4 ADMINISTRATIVE REQUIREMENTS:

- A. Coordination: Coordinate panel assemblies with rain drainage, flashing, trim, stud back-up, soffits, and other adjoining work.
- B. Preinstallation Meeting:
 - 1. Attendees:
 - a. Owner
 - b. Architect.
 - c. Installer
 - d. Exterior wall panel manufacturer's representative.
 - e. Continuous insulation wall panel support system manufacturer's representative.
 - f. Installer's whose work interfaces with or affects wall panels including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule.
 - 3. Verify availability of materials, installer's personnel, equipment, and facilities needed to maintain schedule.
 - 4. Review means and methods related to installation, including manufacturer's written instructions.
 - 5. Examine support conditions for compliance with requirements, including alignment and attachment to structural members.
 - 6. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affects this Work.
 - 7. Review temporary protection requirements for during and after installation of this Work.

1.5 SUBMITTALS:

- A. See Section 013000 – Administrative Requirements, for submittal procedures.
- B. Product Data: Submit for each type of product indicated; include construction details, material descriptions, dimensions of individual components and profiles, and accessory as necessary for complete fully furnished system assembly.
- C. Shop Drawings: Submit fabrication and installation layouts of continuous insulation wall panel support system and exterior cladding system; including details of edge conditions, joints, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 1. Provide distinction between factory-assembled, shop-assembled, and field-assembled work.
 - 2. Provide details of following items at full scale.
 - a. Manufacturer's standard sheet metal trims.
 - b. Components of wall panel construction, anchorage methods, and hardware.
 - 3. Include professional engineer's stamp or seal on shop drawings for attachments and anchors.
- D. Coordination Drawings: Submit to-scale exterior elevations that have the following items shown and coordinated with each other, using input from installers of these items as follows:
 - 1. Exterior wall panel system and attachments.
 - 2. Sub-Girts.
 - 3. Continuous insulation wall panel support system.
 - 4. Insulation layout.
 - 5. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
 - 6. Wall penetrations, such as from pipes, electrical fixtures, and other utilities.

- E. Test and Inspection Reports: Submit test and inspection reports on each type of exterior wall panel system provided for project based on evaluation of comprehensive tests performed by qualified testing agency.
 - 1. Refer to Section 014000.
- F. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with at least three years of documented experience.
- B. Installer: Company specializing in performing work of this section and as follows.
 - 1. Installer shall install system in strict compliance with manufacturer's installation instructions.
 - 2. Installer has not less than three years of documented experience.
 - 3. Installer is factory trained and approved by wall panel support system manufacturer.
- C. Design Engineer's Qualifications: Design structural supports and anchorages under direct supervision of a Structural Engineer experienced in design for this type of Work and licensed in the State that the Project is located.
- D. Source Limitations: Obtain wall panel support system and continuous insulation from single source and single manufacturer.

1.7 MOCKUPS:

- A. Mockups: Provide mockups to verify selections, to demonstrate aesthetic effects, and to establish quality standards for fabrication and installation.
 - 1. Build mockup of typical continuous insulation wall panel assembly, including corner, supports, attachments, and accessories.
 - a. Include at least four exterior wall panels to represent a four-way panel joint and showing full thickness.
 - 2. Approval of mockups does not constitute approval of deviation from Contract Documents within mockups unless these deviations are approved by Architect in writing.
 - 3. Subject to compliance with requirements, approved mockups may not become part of completed Work if undisturbed upon date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to site in manufacturer's original unopened containers and packaging with labels clearly identifying product name and manufacturer.
 - 1. Deliver components and other manufactured items or accessories without damage or deformation.
- B. Storage and Handling: Store materials in clean, dry, interior area in accordance with manufacturer's instructions.
- C. Protect components during transportation, handling, and installation from weather, excessive temperatures and construction operations.
- D. Handle components in strict compliance with manufacturer's written instructions and recommendations, and in a manner to prevent bending, warping, twisting, and surface damage.

1.9 SITE CONDITIONS:

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of this Work to be performed according to manufacturer's installation instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before wall panel support system fabrication and indicate measurements on Shop Drawings.
 - 1. Coordinate with construction schedule.

1.10 WARRANTY:

- A. See Section 01770 - Closeout Procedures, for additional warranty requirements.
- B. Wall Panel Support System Warranty: Provide jointly written warranty by manufacturer and installer, agreeing to correct defects in manufacturing or installation within a five year period after Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Advanced Architectural Products (AAP): SMARTci and Greengirt Composite Framing System (CFS)** or a comparable product by one of the following:
 - 1. Cascadia Clip.
 - 2. ACS Composite Systems, Inc.

2.2 DESCRIPTION:

- A. Composite framing support (CFS) members anchored to [metal stud wall framing over exterior wall sheathing.
- B. Insulation panels are installed vertically or horizontally between the CFS members. Reference Drawings.

2.3 PERFORMANCE CRITERIA:

- A. Structural: Provide system tested in accordance with ASTM E330 and certified to be without permanent deformation or failure of structural members in accordance with design wind velocities for project geographic location and probability of occurrence based on data from wind velocity maps such as provided in ASCE 7 and as approved by authorities having jurisdiction.
 - 1. Measure performance using test loads equal to 1-1/2 times the design wind loads and with 10 second duration of maximum pressure.
 - 2. Composite Framing Supports (CFS): Structurally engineered to provide in excess of 3 times structural safety factor for lengthwise, longitudinal, and crosswise loading.
- B. Hygrothermal: Provide system designed in accordance with ASHRAE 160, to pass requisite 30 day, 7 day and 24 hour wall moisture content requirements. Testing and validation shall be done through WUFI or other approved transient hygrothermal/moisture modeling systems.
- C. System Thermal Design: Installed continuous insulation system including insulation, composite framing support, sub-girts, clips and cladding attachment shall not have thermal bridging of fasteners or framing that creates a continuous metal path from the exterior surface of the insulation to the stud framing inside the wall cavity. System thermal design shall meet/exceed the thermal and design requirements as stated in ASHRAE 90.1-2012 or 2012 IBCC codes.
 - 1. Thermal Resistance: Wall assembly U Value of 0.053 or R Value of 18.9.

2. Thermal Performance Test: Provide thermal resistance (R-value) indicated, in compliance with ASTM C1363, corrected to 15 mph outside and still air inside, with as-installed condition including fastening and joints.
 - a. Provide efficiency of no less than 86-95 percent, with a maximum temperature differential of 18 degrees F from the interior wall surface to interior wall cavity and node locations with a 70 degree exterior to interior wall temperature delta.
 - b. Provide test unit with at least one insulation panel horizontal and vertical joint the length and height of the test chamber area.
 - c. Or Provide finite element analysis of three dimensional simulation of the described wall assembly stamped by professional engineer in compliance with the performance requirements and exceeding it by 3%.
- D. Temperature: Comply with structural loading requirements within temperature range of minus 55 degrees F to 180 degrees F.
- E. Fire-Test-Response Characteristics: Provide wall panel support system with the following fire-test-response characteristics determined by the indicated test standard as applied by UL or other testing and inspection agency acceptable to authorities having jurisdiction.
 1. Surface Burning Characteristics: Not greater than the following, per ASTM E84 or UL 723, for foam insulation, FRP and interior surface:
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.
 2. Intermediate Scale Multistory Fire Test: Comply with NFPA 285 and International Building Code (IBC) 2012 acceptance criteria for wall height above grade and fire separation distances.

2.4 COMPOSITE FRAMING SUPPORT:

- A. Composite Framing Support (CFS): CFS shall consist of polyester and vinyl ester bioresin matrix with recycled materials, ultra-violet inhibitor, fire retardant additives, and integral continuous metal inserts the length of profile. CFS shall be reinforced with glass strand rovings used internally for longitudinal (lengthwise) strength and continuous strand glass mats or stitched reinforcements used internally for transverse (crosswise) strength.
 1. Height: 2inch high – Simple Z-GreenGirt.
 2. On Center Spacing: 24 inch.
 3. CFS Orientation: Horizontal and Vertical. Reference Drawings for locations.
 4. Provide continuous non-corrosive steel insert for engagement of fasteners, 16 gage with G90 coating designation in compliance with ASTM A653.
 - a. Steel insert shall fully engage with adjacent CFS at ends.
 - b. Sub-girts and other exterior wall panel support accessories shall be anchored to steel insert set into and part of the CFS.
 5. Provide integral compression seal in CFS sections to ensure insulation panel will not dislodge and to stop air movement throughout system.
 6. CFS section to have integral anti-siphon grooves on exterior flanges.
 7. CFS section to have force distribution zones integrally designed into profile.
 8. CFS to have spline seals for adjacent insulation units.
 9. Surface Burning Characteristics:
 - a. Flame Spread: 25 or less, when tested in accordance with ASTM E84.
 - b. Smoke Development: 450 or less, when tested in accordance with ASTM E84.
 10. Flammability: UL 94.
 11. Self-Extinguishing: ASTM D635.
 12. Profile Visual Requirements: ASTM D4385.
 13. Tensile Stress: Engineered lengthwise and crosswise tensile stress is in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D638.
 14. Compressive Stress: Engineered lengthwise and crosswise compressive stress is in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D695.
 15. Flexural Stress: Engineered lengthwise and crosswise flexural stress is in compliance with performance loading criteria and specified safety factors, in accordance with ASTM D790.

16. Modulus of Elasticity: Engineered to meet the performance loading criteria and specified safety factors.
17. Barcol Hardness: 45, in accordance with ASTM D2583.
18. Water Absorption: Less than 0.46 percent by weight, within 24 hours, in accordance with ASTM D570.
19. Density: Within range of 0.062 to 0.070 lbs/cu in, in accordance with ASTM D792.
20. Lengthwise Coefficient of Thermal Expansion: 7.0×10^{-6} inch/inch/degrees F, in accordance with ASTM D696.
21. Notched Izod Impact, Lengthwise: 24 ft lbs/in, in accordance with ASTM D256 within temperature range indicated.
22. Notched Izod Impact, Crosswise: 4 ft lbs/in, in accordance with ASTM D256 within temperature range indicated.
23. Basis of Design: Advanced Architectural Products (AAP).
 - a. Product 4.5 inch high – Simple Z-GreenGirt] (www.smartcisystems.com)

2.5 INSULATION:

- A. Polyisocyanurate Panel Insulation: Rigid cellular foam, complying with ASTM C1289; Type I, Class 1 with aluminum foil both faces.
 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 3. Thermal Resistance: 2 inch, R-Value 13.1; ASTM C518 at 75 degrees F.
 4. Comply with fire-resistance requirements, as indicated on the Drawings, and as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
 5. Compressive Strength: Grade 3, 25 psi; ASTM D1621.
 6. Dimensional Stability: Less than 2 percent linear change after 7 days; ASTM D2126.
 7. Moisture Vapor Permeance: Less than 0.05 perm; ASTM E96.
 8. Water Absorption: Is less than 0.05 percent by volume; ASTM C209.
 9. Service Temperature: Range of minus 100 degrees F to 250 degrees F.
 10. Basis of Design: Hunter Panels, LLC; Product Xci Foil (www.hunterxci.com).

2.6 SUB-GIRTS:

- A. Sub-Girts: Provide metallic coated steel with G90 (Z275) coating designation, ASTM A653/A653M; structural quality.
 1. Size: 1 inch deep hat girt.
 2. Gage: 16 gage.
 3. On Center Spacing: 24 inch.
 4. Orientation: Horizontal or Vertical. Reference Drawings.
 5. Basis of Design: Architectural Advanced Panels; Product AAP 1000 Hat Girt (www.smartcisystems.com).

2.7 ASSEMBLY:

- A. Assemble continuous insulation wall panel support system using manufacturer's standard procedures and processes identical to tested units and as necessary to comply with performance requirements indicated.
 1. Comply with exterior wall panel profiles and with dimensional and structural requirements as indicated on the Drawings.
 2. Fabricate wall panel support system with joints between exterior wall panels designed to form weathertight seals.
 3. Form wall panel support system in a continuous process with no glues or adhesives between dissimilar materials.
 4. The CFS and Insulation panels shall create a 3 in 1 Air/Water/Vapor class 1 barrier system compliant with requirements for project geographic zone.

2.8 ACCESSORIES:

- A. Provide accessories necessary for a complete wall panel support system including metal closure trim, transition angle, strapping, tie-in brackets and similar items.

- B. Fasteners: Corrosion-resistant, self-tapping and self-drilling screws, bolts, nuts, and other fasteners as recommended by panel support system manufacturer for project application.
 - 1. Cladding to Greengirt: Use standard Tek® brand screws.
 - 2. Greengirt to Stud Wall Framing: Use standard Tek® brand screws.
 - 3. Greengirt to Concrete/CMU: Use Tapcon® brand anchors.

- C. Flashing and Trim: Match material, finish, and color of adjacent wall panels.
 - 1. Thickness: At least 0.040 inch.
 - 2. Refer to Section 076200 for requirements.

- D. Wall Sheathing: Glass mat faced gypsum, ASTM C1177/C1177M, square long edges, 5/8 inch thick, Type X fire-resistant.
 - 1. Refer to Drawings and Section 061600 for requirements.

- E. Air and Vapor Barriers: Provide climate specific air and vapor barrier with performance characteristics for air penetration, water vapor transmission (perms), and water penetration resistance.
 - 1. Refer to Section 072726 for requirements.

- F. Sealants: Provide sealants as recommended by exterior wall panel manufacturer for openings within wall panels and perimeter conditions.
 - 1. Refer to Section 079200 for requirements.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas of this work, and project conditions with installer present for compliance with requirements for installation tolerances, substrates, wall panel support conditions, and other conditions affecting performance of this Work.
- B. Examine structural wall framing to ensure that angles, channels, studs, and other structural support members have been installed within alignment tolerances required by continuous insulation wall panel support system manufacturer.
- C. Verify that water resistive barrier has been installed over exterior sheathing to control air infiltration or water penetration as indicated for project.
- D. Examine rough-in for components and systems penetrating wall panel support system to coordinate actual locations of penetrations relative to exterior wall panel joint locations prior to installation.
- E. Verify that mechanical and electrical services for exterior walls have been installed and tested and, if appropriate, verify that adjacent materials and finishes are dry and ready to receive insulation.
- F. Proceed with installation only after exterior walls have been properly prepared and unsatisfactory conditions have been corrected.

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.

- C. Prepare sub-girt, base angles, sills, furring, and other wall panel support members and provide anchorage in accordance with ASTM C754 for gypsum panel type substrates and panel manufacturer's installation instructions.

3.3 INSTALLATION :

- A. Install wall panel support system in accordance with manufacturer's installation instructions.
- B. Install system to fill-in exterior spaces without gaps or voids. Do not compress panel insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within plane of insulation.
- E. Exposed insulation must be protected from open flame and kept dry at all times.
- F. Exterior wall insulation panels are not intended to be left exposed for periods of time in excess of 60 days without adequate protection.
 - 1. When extended exposure is anticipated, protect exposed insulation surfaces including corners, window and door openings with a compatible waterproof tape.
- G. Install wall panel support system in compliance with exterior wall panel orientation, sizes, and locations as indicated on Drawings.
 - 1. Refer to Section 074646.

3.4 TOLERANCES:

- A. Shim and align wall panel units with installed tolerances of 1/4 inch in 20 feet, non-cumulative, on level, plumb, and location lines as indicated.

3.5 PROTECTION:

- A. Protect installed products from damage until date of Substantial Completion.
- B. Ensure that insulation panels are not exposed to moisture.
 - 1. Remove wet insulation panels or allow them to completely dry prior to installation of exterior wall panel system.
- C. Replace damaged insulation panels prior to date of Substantial Completion.

END OF SECTION 074210

SECTION 074213.23

METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section includes metal composite material wall panels.
- B. Related Sections include the following:
 - 1. Division 07 Section "Sheet Metal Flashing and Trim" for flashings and other sheet metal work not part of metal wall panel assemblies.
 - 2. Division 07 Section "Fluid-Applied Membrane Air Barriers" applied to cavity face sheathing of light gage metal framing of cavity walls.
 - 3. Division 07 Section "Continuous Insulation Wall Panel Support System" for polyisocyanurate insulation applied to cavity face sheathing of light gage metal framing of cavity walls.
 - 4. Division 07 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

1.3 DEFINITIONS:

- A. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight system.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Provide metal wall panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Edge securement for low-slope roofs. Low-slope membrane roof systems metal edge securement, except gutters, installed in accordance with Oklahoma State Building Code Section 1504, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be as follows:
 - 1. Wind Speed: 120 mph.
- C. Cladding components shall be designed and anchored to resist wind-induced overturning, uplift and sliding in accordance with Oklahoma State Building Code Paragraph 1609.1.3.
 - 1. Wind Speed: 120 mph.
- D. Water Penetration: No water penetration when tested according to ASTM E 331 at a minimum differential pressure of 10 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. and not more than 12 lbf/sq. ft. after 15 minutes.
- E. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
 - 1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Horizontal Design Pressure: 26 lbf/sq. ft., acting inward or outward.
 - b. Vertical Design Pressure: 42 lbf/sq. ft., acting inward or outward.

- c. Uniform pressure as indicated on Drawings.
- F. Seismic Performance: Provide metal wall panel assemblies capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- G. Thermal Movements: Provide metal wall panel assemblies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- H. Thermal Movements for Metal-Faced Composite Wall Panels: Provide composite wall panel assemblies that allow for noiseless thermal movements resulting from the following range in ambient temperatures and that prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects:
 - 1. Ambient Temperature Range: Minus 20 to plus 180 deg F.
- I. Thermal Performance: Provide insulated metal wall panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 236 or ASTM C 518.
- J. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

1.5 SUBMITTALS:

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
 - 1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches:
 - a. Flashing and trim.
 - 2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Delegated-Design Submittal: For metal-faced composite wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
 - 1. Wall panels and attachments.
 - 2. Stud framing.
 - 3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
- E. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
 - 1. Include similar Samples of trim and accessories involving color selection.

2. Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
- F. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Wall Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
 - a. Include four-way joint for composite panels.
 2. Trim and Closures: 12 inches long. Include fasteners and other exposed accessories.
 3. Accessories: 12-inch- long Samples for each type of accessory.
- G. Qualification Data: For Installer, professional engineer and testing agency.
- H. Material Certificates: For thermal insulation, signed by manufacturers.
- I. 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. Field quality-control test reports.
- K. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for the following:
1. Metal Wall Panels: Include reports for air infiltration, water penetration, and structural performance.
 2. Insulation: Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- L. Research/Evaluation Reports: For metal-faced composite wall panels.
- M. Maintenance Data: For metal wall panels to include in maintenance manuals.
- N. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Installer Qualifications: Fabricator of metal-faced composite wall panels.
 1. Installer's responsibilities include fabricating and installing metal wall panel assemblies and providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 3. Engineering Responsibility: Preparation of data for metal wall panels, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- C. Fabricator Qualifications: Certified by metal-faced composite wall panel manufacturer to fabricate and install manufacturer's wall panel system.

- D. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated, as documented according to ASTM E 548.
- E. Source Limitations: Obtain each type of metal wall panel through one source from a single manufacturer.
- F. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal wall panels and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- G. 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 manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - a. Perform tests under environmental conditions replicating those that will exist during installation.
 - 2. Submit no fewer than nine pieces of each type 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 the use of specially formulated primers.
- H. Surface-Burning Characteristics: Provide insulated metal wall panels having insulation-core materials 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, unless otherwise indicated.
 - 2. Smoke-Developed Index: 450 or less, unless otherwise indicated.
- I. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution.
 - 1. Build mockup of typical corner wall panel, as shown on Drawings; approximately 48 inches square by full thickness, including insulation, supports, attachments, and accessories.
 - a. Include four-way joint for metal-faced composite wall panels.
 - 2. Approval of mockups is for other material and construction qualities specifically approved by Architect in writing.
 - 3. 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.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- J. Preliminary Siding Conference: Before starting wall framing, sheathing construction, conduct conference at Project site. Comply with requirements for preinstallation conferences in Division 1 Section "Project Management and Coordination." Review methods and procedures related to wall framing and sheathing construction and metal wall panels including, but not limited to, the following:
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 7. Review temporary protection requirements for metal wall panel assembly during and after installation.
 8. Review wall panel observation and repair procedures after metal wall panel installation.
- K. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, metal wall panel Installer, metal wall panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal wall panels including installers of doors, windows, and louvers.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review methods and procedures related to metal wall panel installation, including manufacturer's written instructions.
 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 6. Review governing regulations and requirements for insurance, certificates, and testing and inspecting if applicable.
 7. Review temporary protection requirements for metal wall panel assembly during and after installation.
 8. Review wall panel observation and repair procedures after metal wall panel installation.
 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- B. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

- C. Store metal-faced composite wall panels vertically, covered with suitable weathertight and ventilated covering. Store metal-faced composite wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal-faced composite wall panels in contact with other materials that might cause staining, denting, or other surface damage. Do not allow storage space to exceed 120 deg F.
- D. Protect strippable protective covering on metal wall panels from exposure to sunlight and high humidity, except to extent necessary for period of metal wall panel installation.
- E. Protect foam-plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - 3. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.8 PROJECT CONDITIONS:

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal wall panels to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify locations of structural members and wall opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal wall panels without field measurements, or allow for field trimming of panels. Coordinate wall construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.9 COORDINATION:

- A. Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY:

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

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 PANELS:

- A. Aluminum Composite Material [MCP-(#)] Fire Retardant Core:
1. Composition: Two sheets of aluminum sandwiching a core of extruded thermoplastic formed in a continuous process without the use of glues or adhesives between dissimilar materials. Bond integrity testing to adhere to ASTM D1781-76.
 2. Aluminum face sheets: Aluminum alloy 3003, thickness: .020."
 3. Panel thickness: 4 mm (.157").
 4. Panel weight: 1.12 lbs. / square foot.
 5. Tolerances:
 - a. Panel bow: Maximum 0.8% of panel dimension (width or length).
 - b. Panel Dimensions: Take site measurements before proceeding with production unless dimensions can be guaranteed by General Contractor.
 - c. Panel lines, breaks and angles to be sharp and true; panel surfaces to be free from warp or buckle.
 6. Core: Fire retardant.
 7. Basis-of-Design Product: Subject to compliance with requirements, provide "**Rainscreen System II;**" **Alucobond Plus** or a comparable product by one of the following:
 - a. Alpolic
 - b. 3A Composites USA, Inc.
 - c. Alcoa Inc.
 - d. CENTRIA Architectural Systems.
 - e. Citadel Architectural Products, Inc.
 - f. Fairview Architectural North America.
 - g. Firestone Metal Products, LLC.
 - h. Protean Construction Products, Inc.

B. Finishes:

1. Exposed Finishes: Apply the following coil coating, as specified or indicated on Drawings.
 - a. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 1.5 mil (0.038 mm); complying with physical properties and coating performance requirements of AAMA 2605, except as modified below:
 - a) Humidity Resistance: 1000 hours.
 - b) Salt-Spray Resistance: 1000 hours.
 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

C. Colors:

1. [MCP-1]: As selected by Architect.

D. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated.

2.3 MISCELLANEOUS METAL FRAMING:

- A. Attachment System Components: Formed from extruded aluminum.
 1. Include manufacturer's standard perimeter extrusions with integral weather stripping, panel stiffeners, panel clips and anchor channels.
- B. Steel Sheet Components, General: Complying with ASTM C 645 requirements for metal and with ASTM A 653/A 653M, G90 (Z275), hot-dip galvanized zinc coating.
 1. Zee Clips: Minimum 0.079-inch base steel thickness.

2.4 MISCELLANEOUS MATERIALS:

- A. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
 1. Exposed Fasteners for Composite Panels: Stainless steel.
 2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- B. Flashing and Trim: Same material, finish, and color as facings of adjacent composite panels, unless otherwise indicated.

2.5 ACCESSORIES:

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.

2.6 FABRICATION:

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Form panel lines, breaks, and angles to be sharp and true, with surfaces free from warp and buckle.
 - 2. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Where indicated, fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- E. Metal-Faced Composite Wall Panels: Factory form panels in a continuous process with no glues or adhesives between dissimilar materials. Trim and square edges of sheets with no displacement of face sheets or protrusion of core material.
 - 1. Fabricate panels with panel stiffeners, as required to comply with deflection limits, attached to back of panels with structural silicone sealant or bond tape.
 - 2. Fabricate panels with sharply cut edges, with no displacement of face sheets or protrusion of core material.
 - 3. Dimensional Tolerances:
 - a. Length: Plus 0.375 inch.
 - b. Width: Plus 0.188 inch.
 - c. Thickness: Plus or minus 0.008 inch.
 - d. Panel Bow: 0.8 percent maximum of panel length or width.
 - e. Squareness: 0.2 inch maximum.
- F. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.7 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 and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
 1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Install flashings and other sheet metal to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."

- C. Install fasciae and copings to comply with requirements specified in Division 7 Section "Sheet Metal Flashing and Trim."
- D. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

3.3 METAL WALL PANEL INSTALLATION, GENERAL:

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Field cutting of metal wall panels by torch is not permitted.
 - 2. Shim or otherwise plumb substrates receiving metal wall panels.
 - 3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
 - 4. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - 5. Install screw fasteners in pre-drilled holes.
 - 6. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 7. Install flashing and trim as metal wall panel work proceeds.
 - 8. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Fasteners:
 - 1. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.
 - 1. Coat back side of aluminum wall panels with bituminous coating where wall panels will contact wood, ferrous metal, or cementitious construction.
- D. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
 - 1. Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

3.4 METAL-FACED COMPOSITE WALL PANEL INSTALLATION:

- A. General: Install attachment system required to support wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

2. Do not begin installation until weather barrier and flashings that will be concealed by composite panels are installed.
- B. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.
1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 079200 "Joint Sealants."
 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.

3.5 ACCESSORY INSTALLATION:

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.6 ERECTION TOLERANCES:

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

3.7 CLEANING AND PROTECTION:

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

END OF SECTION 074213.23

SECTION 074646

FIBRE CEMENT WALL PANELS

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: The Work of this Section includes Fibre cement panels of the following types:
 1. Through color high density fibre cement EQUITONE [linea] panels.
 - a. EQUITONE [linea] is a through colored panel with no coating. As the panel has an honest, pure and natural appearance color differences are possible. The surface of the sheet is characterised by fine sanding lines and white spots.
 2. Fixed with either
 - a. Visible EQUITONE rivets colored to match the panel.
 - b. Invisible concealed Tergo system
 - c. Invisible glue system.

1.3 RELATED WORK SPECIFIED ELSEWHERE

- A. Carefully examine Contract Documents for requirements that affect work of this section.
- B. Other specifications sections that directly relate to work of this section include, but are not limited to, the following:
 1. Section 054000 - Cold-Formed Metal Framing.
 2. Section 072726 - Fluid-Applied Membrane Air Barriers: Exterior wall air and moisture barrier
 3. Section 074210 – Continuous Insulation Wall Panel Support System; exterior insulation, if required for NFPA 285 compliance, is not included in the scope of Section 07450.

1.4 REFERENCES

- A. ASTM International (ASTM):
 1. ASTM C 1185 - 08 Standard Test Methods for Sampling and Testing Non-Asbestos Fibre-Cement Flat Sheet, Roofing and Siding Shingles, and Clapboards.
 2. ASTM C 1186 - 08 Standard Specification for Flat Fibre-Cement Sheets.
 3. ASTM E 84 - Surface Burning Characteristics of Building Materials.
 4. ASTM E 136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degree C.
- B. Materials and Equipment Acceptance (MEA) - New York City Department of Buildings Division.

- C. CEN - European Committee For Standardization: EN12467 - Fibre Cement Flat Sheets - Product Specification and Test Methods.
- D. CCHD - Coding Center Heidelberg: Performance Test Report.

1.5 SUBMITTALS

- A. Products Submittals shall be per Section 01 33 00 – Submittal Procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including, but not limited to:
 - 1. Preparation instructions and recommendations for EQUITONE [linea].
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods for the supporting framework and the EQUITONE [linea] panels.
- C. Shop Drawings: Provide detailed drawings of non-standard applications of fibre cement materials which are outside the scope of the standard details and specifications provided by the manufacturer.
- D. Code Compliance: Documents showing product compliance with local building code shall be submitted prior to the bid. These documents shall include, but not be limited to, appropriate Evaluation Reports and/or test reports supporting the use of the product.
- E. Engineering Calculations: Submit engineering calculations as required by the local building code, showing that the installed panels and attachment system meets the wind load requirements for the project.
- F. Selection Samples: For each finish product specified, two complete sets of 5 ¼" x 2 1/2" (160x65mm) color chips representing manufacturer's full range of colors and patterns available in the US shall be provided upon request.
- G. Verification Samples: For each finish product specified, two samples, minimum size 12 inches (305 mm) square, representing actual product, color, and patterns.
- H. Operation and Maintenance Data: Submit operation, maintenance, and cleaning information for products covered under this section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: All products listed in this section are to be installed by a single installer trained and approved by the manufacture or representative.
- B. Color Evaluation: No change, 2000 hours of accelerated weathering with color evaluation, CCHD Performance Test Report.
- C. Mock-Up: Provide a full size mock-up minimum 6' by 10' for evaluation of surface preparation techniques and application workmanship.
 - 1. Finish areas designated by Architect.
 - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Moving panels that are stacked on pallets should be done with a forklift or a crane. Ensure the panels are secured to the pallet in a way that will not cause damage. Stacks should be transported under a waterproof cover.
- B. All panel materials must be stored flat on pallets, inside and undercover in dry conditions, protected from weather and other trades. Stack the pallets in a way so that the panels are ventilated.
- C. Always lift panels off of each other, never slide them over one another, since scratching may occur.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits or which could involve life safety situations.
- B. Field Measurements: Verify actual measurements/openings by field measurements performed by the installer prior to release for fabrication. The General Contractor or Installer shall be responsible for existing site dimensions. Recorded measurements shall be indicated on shop drawings based on field measurements provided by the installer. Coordinate field measurements and fabrication schedule with construction progress to avoid construction delays.

1.9 WARRANTY

- A. Warranty: At project closeout, provide manufacturer's limited fifteen (15) year warranty covering defects in materials. Warranty is only available when material is installed by an installation contractor trained and approved by the manufacturer's representative.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. As a basis of Design, Fibre Cement Panels shall be manufactured by Equitone: 1731 Fred Lawson Dr, TN 37801. Tel: (888) 681-0155 Fax: (865) 681-0016. Email: mleroy@equitone.com. Web: <http://www.equitone.com>.
- B. Substitutions: Not permitted.
- C. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 WALL PANELS

- A. Through Color High Density Fibre Cement Panels:
 - 1. Product: EQUITONE [linea] Fibre Cement Panel
 - a. Application: Exterior.
 - c. Thickness: 5/16 inch (8 mm/10mm).

- d. Finish: EQUITONE [tectiva] is a through colored panel with no coating. As the panel has an honest, pure and natural appearance color differences are possible. The surface of the sheet is characterised by fine sanding lines and white spots. The rear receives no back-sealing coating. The board receives a hydrophobation which prevents moisture ingress into the core of the panel.
- e. Physical Characteristics: ASTM C1185, ASTM C1186, EN 12467 'Fibre-cement flat sheets'.
- | | | |
|-----|--|---|
| 1) | Density Dry: | Minimum 1.78 kg/m ³ (111 lb/ft ³) |
| 2) | Bending strength @ ambient, perpendicular: | 32.0 N/mm ² (4,641 lbf/in ²) |
| 3) | Bending strength @ ambient, parallel: | 22N/mm ² . (3,190 lbf/in ²) |
| 4) | Modulus of elasticity @ ambient, perpendicular: | > 14,000N/mm ² . (> 2,030,532lbf/in ²) |
| 5) | Hygric movement 0-100%, mean: | 1.60 mm/m. |
| 6) | Porosity 0-100%: | < 25 %. |
| 7) | Durability classification (EN 12467): | Category A. |
| 8) | Strength classification (EN 12467): | Class 4. |
| 9) | Fire reaction (EN 13501-1): | A2-s1-d0; |
| | ASTM E84-Zero Flame Spread and smoke development of < 5; | |
| | ASTM E-136 - passed. | |
| 10) | Impermeability test: | Ok. |
| 11) | Warm water test: | Ok. |
| 12) | Soak dry test: | Ok. |
| 13) | Freeze thaw test: | Ok. |
| 14) | Thermal conductivity: | 0.39 W/mK. |

2.3 MISCELLANEOUS CLADDING MATERIALS

- A. Perforated Insect/Vermin Screen: Manufacturer's standard.
- B. Building Wrap: Approved Building Wrap complying with local codes for product and installation requirements.
- C. Aluminum Joint Closures and Decorative Corner Profiles: Manufacturer's standard products as detailed. Maximum thickness of non structural finishing profile to be 0.8 mm or 21 gauge.
- D. Panel Fastening Options: [Visible Rivets] [Tergo Secret Fixing] [Glue Fixing].

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean panel surfaces thoroughly prior to installation. Remove any cutting or drilling dust from the surface of the panel using a micro-soft cloth. [This is especially important when panels are being adhesively fixed]
- B. Prepare surfaces using the methods recommended by Equitone for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions and approved submittals.
- B. For exterior applications, comply with local codes and structural engineer's fastening calculations along with manufacturer's recommendations for fastener spacing.

3.4 EXTERIOR CLADDING FOR RAINSCREEN APPLICATIONS

A. Detailing Requirements:

1. Air space inlets and outlets are required at top and bottom of building or wall termination and shall be equivalent to a continuous 1/2 inch to 3/4 inch (12 mm to 18 mm) to facilitate airflow behind the panels. Do not block vertical airflow at windows, doors, eaves, or at the base of the building. Airflow shall be continuous from bottom to top so there is air movement behind each panel. The minimum cavity width should be at least 25/32" (20mm) for facades up to 33' (10m) high. For facades between 66'-165' (20-50 m) the cavity width needs to increase to 1 3/16" (30mm). Air flow behind the fiber cement panels is critical to the performance of the rain screen constructions.
2. Fasteners in profile shall accommodate thermal expansion/contraction of metal and not interfere with panel application.
3. Install panels starting from top of building and work down the facade.
4. For straight walls, start panel installation in center and work outward.
5. For walls with inside corners, start installation at corner and work across wall.
6. Pattern: Straight pattern with vertical panels. Panel size as indicated.
7. Pattern: Straight pattern with horizontal panels. Panel size as indicated.
8. Pattern: Semi pattern with horizontal panels. Panel size as indicated.

- B. Rain Screen Installation: Comply with manufacturer's installation requirements.

3.5 PROTECTION

- A. Protect installed products until completion of project.

- B. Touch-up, repair or replace damaged products before Substantial Completion.
- END OF SECTION

SECTION 075216 STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. New 3-ply modified bituminous membrane roofing.
 - 2. Roofing insulation.
 - 3. Walkways.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking, curbs, cants, and nailers; and wood-based, structural-use roof deck panels.
 - 2. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
 - 3. Division 07 Section "Roof Accessories."
 - 4. Division 07 Section "Joint Sealants."
 - 5. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

1.3 DEFINITIONS:

- A. Roofing Terminology: Refer to ASTM D 1079 for definitions of terms related to roofing work not otherwise defined in this Section.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Install a watertight, modified bituminous membrane roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.
- B. FM Listing: Provide modified bituminous membrane, base flashings, and component materials that meet requirements of FM 4450 and FM 4470 as part of a roofing system and that are listed in FM's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM markings.
 - 1. Roofing system shall comply with the following:
 - a. Fire/Windstorm Classification: Class 1A-90.
 - b. FM 4450 or UL 1256.
 - c. Hail-Resistance Rating: SH.

- C. Roofing System Design: Provide a roofing system designed for wind uplift that complies with roofing system manufacturer's written design instructions and with the following:

- 1. Wind Speed at Project Site: 110 mph.

1.5 SUBMITTALS:

- A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: Include plans, sections, details, and attachments to other work, for the following:
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation, including slopes.
 - 3. Crickets, saddles, and tapered edge strips, including slopes.
 - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- C. Samples for Verification: Of the following products:
 - 1. 12-by-12-inch square of base sheet, and base-ply sheet.
 - 2. 12-by-12-inch square of modified bituminous, granule-surfaced cap sheets, of color specified.
 - 3. 12-by-12-inch square of walkway pad.
 - 4. Six insulation fasteners of each type, length, and finish.
- D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system and is eligible to receive the standard roofing manufacturer's warranty.
- E. Manufacturer Certificates: Signed by roofing system manufacturer certifying that the roofing system complies with requirements specified in the "Performance Requirements" Article. Upon request, submit evidence of complying with requirements.
 - 1. Certificate Of Analysis from the testing laboratory of the primary roofing materials manufacturer, confirming the physical and mechanical properties of the roofing membrane components. Testing shall be in accordance with the parameters published in ASTM D 5147 and ASTM D 6298* and indicate Quality Assurance/Quality Control data as required to meet the specified properties. A separate Certificate Of Analysis for each production run of material shall indicate the following information:
 - a. Material type
 - b. Lot number
 - c. Production date

- d. Dimensions and Mass (indicate the lowest values recorded during the production run);
 - 1) Roll length
 - 2) Roll width
 - 3) Selvage width
 - 4) Total thickness
 - 5) Thickness at selvage (coating thickness)
 - 6) Weight

- e. Physical and Mechanical Properties;
 - 1) Low temperature flexibility
 - 2) Maximum load
 - 3) Elongation @ 5% Maximum Load (ultimate elongation)
 - 4) Dimensional stability
 - 5) High Temperature Stability
 - 6) Granule embedment
 - 7) Resistance to thermal shock* (foil faced products)

- F. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

- G. Research/Evaluation Reports: Evidence of roofing system's compliance with building code in effect for Project from a model code organization acceptable to authorities having jurisdiction.

- H. Maintenance Data: For roofing system to include in the maintenance manuals specified in Division 1.

- I. Warranty: Sample copy of standard roofing manufacturer's warranty stating obligations, remedies, limitations, and exclusions of warranty.

- J. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roof installation.

- K. Letter from the proposed primary roofing manufacturer confirming that the filler content in the elastomeric blend of the proposed roof membrane and flashing components does not exceed 35% in weight.

- L. Complete list of material physical and mechanical properties for each sheet including: weights and thicknesses; low temperature flexibility; maximum load; elongation @ 5% maximum load (ultimate elongation); dimensional stability; high temperature stability; granule embedment and resistance to thermal shock (foil faced products).

- M. Letter from the proposed primary roofing manufacturer confirming that the proposed roof membrane system meets the requirements of ASTM D 5849 Resistance to Cyclic Joint Displacement (fatigue) at 14F (-10°C). Passing results shall show no signs of membrane cracking or interply delamination after 500 cycles in an unaged specimen and 200 cycles in a specimen after heat conditioning.
- N. Letter from the proposed primary roofing manufacturer confirming that proposed membrane manufacturer has been producing SBS products in the United States for a minimum of 5 years without a change in the basic product design or SBS modified bitumen blend, polymer specification, asphalt and filler formulation.
- O. Evidence that the manufacturer of the proposed roofing system utilizes a quality management system that is ISO 9001:2000 certified. Documentation of ISO 9001:2000 certification of foreign subsidiaries without domestic certification will not be accepted.
- P. Evidence and description of manufacturer's quality control/quality assurance program for the primary roofing products supplied. The quality assurance program description shall include all methods of testing for physical and mechanical property values. Provide confirmation of manufacturer's certificate of analysis for reporting the tested values of the actual material being supplied for the project prior to issuance of the specified guarantee.

1.6 QUALITY ASSURANCE:

- A. **Installer Qualifications:** Engage an experienced installer to perform Work of this Section who has specialized in installing roofing similar to that required for this Project; who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive the standard roofing manufacturer's warranty.
- B. **Fire-Test-Response Characteristics:** Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method indicated below by UL, FM, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Exterior Fire-Test Exposure: Class A; complying with ASTM E 108, for application and slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing materials are a part.
- C. **Preliminary Roofing Conference:** Before starting any work for the Project, conduct conference at Project site. Meet with the same participants and review the same items listed for the preinstallation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.

- D. Preinstallation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.
1. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.
 4. Review loading limitations of deck during and after roofing.
 5. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.
 6. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.
 7. Review temporary protection requirements for roofing system during and after installation.
 8. Review roof observation and repair procedures after roofing installation.
 9. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Store roofing materials in a dry, well-ventilated, weathertight location to ensure no significant moisture pickup and maintain at a temperature exceeding roofing system manufacturer's written instructions. Store rolls of felt and other sheet materials on end on pallets or other raised surfaces. Do not double-stack rolls.
1. Handle and store roofing materials and place equipment in a manner to avoid significant or permanent damage to deck or structural supporting members.
- B. Do not leave unused felts and other sheet materials on the roof overnight or when roofing work is not in progress unless protected from weather and moisture and unless maintained at a temperature exceeding 50 deg F.
- C. Deliver and store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer.
- D. Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.8 PROJECT CONDITIONS:

- A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.

1.9 WARRANTY:

- A. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, and walkway products, for the following warranty period:
 - 1. Warranty Period: Twenty years from date of Substantial Completion.
- C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. SBS-Modified Bituminous Sheet:
 - a. Firestone Building Products.
 - b. GAF Materials Corporation.
 - c. Johns Manville.
 - d. Siplast, Inc.
 - e. Soprema Roofing and Waterproofing, Inc.
- B. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.

2.2 SBS-MODIFIED BITUMINOUS SHEET:

- A. Cap Sheet: ASTM D 6164, Grade S, Type II, SBS-modified asphalt sheet (reinforced with polyester fabric); smooth surfaced; suitable for application method specified.
 - 1. Firestone; SBS Premium FR Torch.
 - 2. Soprema; Sopralene Flam 250 FR GR.
 - 3. GAF Materials Corporation; Ruberoid SBS Heat-Weld Plus Granule FR.

- B. Cap Sheet: ASTM D 6163, Grade G, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; granular surfaced; with a white granular surface; suitable for application method specified, and as follows:
 - 1. Siplast; Paradiene 30 FR TG.
- C. Cap Sheet Color: Gray.

2.3 BASE-PLY SHEET MATERIALS:

- A. Base-Ply Sheet: ASTM D 6164, Grade S, Type I polyester-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
 - 1. Firestone; Poly Torch Base.
 - 2. Soprema; Flam 180.
- B. Base-Ply Sheet: ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
 - 1. Siplast Paradiene 20 TG
 - 2. GAF Materials Corporation; Ruberoid 20.

2.4 BASE-SHEET MATERIALS:

- A. Base Sheet: ASTM D 6164, Grade S, Type I polyester-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
 - 1. Firestone; Poly Torch Base.
 - 2. Soprema; Flam 180
- B. Base Sheet: ASTM D 6163, Grade S, Type I, glass-fiber-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
 - 1. Siplast Paradiene 20 TG
 - 2. GAF Materials Corporation; Ruberoid 20.

2.5 BASE FLASHING SHEET MATERIALS:

- A. Backer Sheet: ASTM D 6164, Grade S, Type I or II, polyester or fiberglass-reinforced, SBS-modified asphalt sheet; smooth surfaced; suitable for application method specified.
- B. Flashing Sheet: ASTM D 6198, SBS-modified bituminous sheet material using foil facing; suitable for application method specified, and as follows:
 - 1. Firestone SBS Metal Flash-AL.
 - 2. Soprema Sopralast 50 TV ALU.
 - 3. Siplast Veral Aluminum.

2.6 AUXILIARY MEMBRANE MATERIALS:

- A. General: Furnish auxiliary materials recommended by roofing system manufacturer for intended use and compatible with SBS-modified bituminous roofing.
 - 1. Furnish liquid-type auxiliary materials that meet VOC limits of authorities having jurisdiction.
- B. Mastic Sealant: Polyisobutylene, plain or modified bituminous, nonhardening, nonmigrating, nonskinning, and nondrying.
- C. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions of FM 4470; designed for fastening for backnailing modified bituminous membrane to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.
- D. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."
- E. Wood Nailer Strips: Furnish wood nailer strips complying with requirements of Division 6 Section "Miscellaneous Carpentry."
- F. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing No. 8 sieve and 98 percent of mass retained on No. 40 sieve.
 - 1. Color: To match color of cap sheet.
- G. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.
- H. Glass-Fiber Fabric: Woven glass cloth, treated with asphalt; complying with ASTM D 1668, Type 1.
- I. Miscellaneous Accessories: Provide miscellaneous accessories recommended by roofing system manufacturer for intended use.
- J. Substrate Joint Tape: 6 or 8 inches wide, coated, glass-fiber joint tape.
- K. Liquid Flashing:
 - 1. Alsan Flashing resin; Soprema.
 - a. Tensile strength @ break, (psi) 368 ASTM D 412
 - b. Elongation (%) 672 ASTM D 412
 - c. Tear resistance (lbf) 23.0 ASTM D 903
 - d. Tear resistance (lbf) 57.27 ASTM D 41547 Sec. 7

- e. Water vapor transmission (perms) 11 ASTM D 1653
 - f. Impact resistance Shore A 74 ASTM D 2240
 - g. Low temperature flexibility (°C) - 26 ASTM D 5147 Sec. 11
 - h. Usage time > 2 hours
 - i. Rainproof after 2 - 12 hours
 - j. Fully cured 3 days -
2. Soprema Alsan PolyFleece is used as flashing reinforcement with Alsan Flashing and other Alsan liquid-applied resins. It is highly flexible, conforms to any shape, irregular penetrations and other surfaces. It has excellent coating saturation capabilities into elastomeric resins.

2.7 ROOF INSULATION:

- A. General: Provide preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.
 - 1. R-Value: Provide insulation thickness (minimum 2-layer application) as required to provide an average, aged "R" value of 20.0, when tested in accordance with 15 year Long Term Thermal Resistance values determined in accordance with CAN/ULC S 770 .
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces.
 - 1. Manufacturers:
 - a. Atlas Roofing Corporation.
 - b. Firestone Building Products Company.
 - c. GAF Materials Corporation.
 - d. Hunter Panels, LLC.
 - e. Johns Manville.
- C. Composite Polyisocyanurate Board Insulation: ASTM C 1289, faced with insulation board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - 1. Manufacturers:
 - a. Atlas Roofing Corporation.
 - b. Firestone Building Products Company.
 - c. GAF Materials Corporation.
 - d. Hunter Panels, LLC.
 - e. Johns Manville International, Inc.
- D. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches, unless otherwise indicated.
- E. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES:

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Insulation Cover Board:
 - 1. Available Products: 1/2" minimum. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dens-Deck Prime; Georgia Pacific.
 - b. DuraBoard; Johns Manville.
 - c. CertainTeed Corporation; GlasRoc Sheathing.
 - d. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
 - e. Sheathing.
 - f. Temple-Inland Building Products by Georgia-Pacific; GreenGlass Exterior Sheathing.
 - g. United States Gypsum Company; Securock Glass Mat Roof Board.
- C. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
 - 1. Cold Adhesive: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fast Adhesive: Carlisle SynTec Incorporated.
 - b. High Velocity Insulation Adhesive; Soprema.
 - c. Armorlock Insulation Adhesive; Honeywell.
 - d. Para-Stik Insulation Adhesive, Siplast.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
- E. Insulation Cant Strips: ASTM C 728, perlite insulation board.
- F. Wood Nailer Strips: Comply with requirements in Division 6 Section "Miscellaneous Carpentry."
- G. Tapered Edge Strips: ASTM C 728, perlite insulation board.
- H. Substrate Joint Tape: 6- or 8-inch- wide, coated, glass-fiber joint tape.

2.9 ROOF WALKWAYS:

- A. Walkway Pads: Mineral-surfaced asphaltic composition panels, factory formed, nonporous, with a slip-resisting surface texture, manufactured specifically for adhering to modified bituminous membrane roofing as a protection course for foot traffic, of the following thickness:
 - 1. Thickness: 3/4 inch.
 - 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Whitewalk Roof Pads; W.R. Meadows.
 - b. Suprawalk; Suprema.
 - c. Trafbloc by Siplast.
 - d. Paratread; Siplast.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions under which roofing will be applied, with Installer present, for compliance with requirements.
- B. Verify that roof openings and penetrations are in place and set and braced and that roof drains are properly clamped into position.
- C. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at roof penetrations and terminations and match the thicknesses of insulation required.
 - 1. Verify that wood nailer strips are located perpendicular to roof slope and are spaced according to requirements of roofing system manufacturer.
- D. Verify that flatness and fastening of metal roof decks comply with installation tolerances specified in Division 5 Section "Steel Deck."
- E. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch out of plane.
- F. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 GENERAL INSTALLATION REQUIREMENTS:

- A. Install modified bituminous membrane roofing system according to roofing system manufacturer's written instructions and applicable recommendations of NRCA/ARMA's "Quality Control Recommendations for Polymer Modified Bitumen Roofing."
 - 1. Install roofing system according to applicable specification plates of NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Start installation of modified bituminous membrane roofing in presence of roofing system manufacturer's technical personnel.
- C. Shingling Plies: Install modified bituminous membrane roofing system with ply sheets shingled uniformly to achieve required number of membrane plies throughout. Shingle in direction to shed water.
 - 1. Where roof slope exceeds 1/2 inch per 12 inches, run sheets of modified bituminous membrane roofing parallel with slope. Backnail top ends of sheets to nailer strips if the slope is greater than 2-1/2 inches per 12 inches.
- D. Cooperate with inspecting and testing agencies engaged or required to perform services for installing modified bituminous membrane roofing system.
- E. Coordinate installing roofing system components so insulation and roofing plies are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.
 - 1. Provide cutoffs at end of each day's work to cover exposed ply sheets and insulation with a course of coated felt with joints and edges sealed.
 - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSULATION INSTALLATION:

- A. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- B. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

- E. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 1-1/2 inches or greater, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
- F. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- G. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- H. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Fasten first layer of insulation to metal deck using mechanical fasteners.
 - 4. Install subsequent layers of insulation in cold adhesive.
- I. Install overboards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together and fasten to roof deck. Tape joints if required by roofing system manufacturer.
 - 1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - 2. Adhere to substrate in a uniform coating of cold-applied adhesive.

3.5 ROOF MEMBRANE INSTALLATION:

- A. General: Install modified bituminous membrane over area to receive roofing, according to manufacturer's written instructions. Extend modified bituminous membrane over and terminate beyond cants.
 - 1. Unroll sheet and allow it to relax for the minimum time period required by manufacturer.
- B. Three-Ply, Modified Bituminous Membrane: Install 3 plies of modified bituminous membrane, consisting of a base ply, an intermediate ply and a finish ply, starting at low point of roofing system.
 - 1. Base-, Intermediate and Finish-Ply Application: Torch apply to substrate.
- C. Laps: Accurately align sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - 1. Repair tears and voids in laps and lapped seams not completely sealed.
 - 2. Apply granules, while asphalt is hot, to cover asphalt bead exuded at laps.

- D. Install modified bituminous membranes with side laps shingled with slope of roof deck where possible.
 - 1. Install modified bituminous membranes with side laps shingled in direction to shed water on each large area of roofing, where slope exceeds 1/2 inch per 12 inches.

3.6 FLASHING AND STRIPPING INSTALLATION:

- A. Install modified bituminous membrane base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
 - 1. Backer Sheet Application: Install base-sheet backer and mechanically fasten to substrate. Adhere flashing backer sheet over roof membrane at cants in cold-applied adhesive.
 - 2. Base Flashing Application: Adhere modified bituminous membrane base flashing to substrate in cold-applied adhesive, applied to substrate and back of base flashing at rate required by roofing system manufacturer.
- B. Extend base flashing up the wall a minimum of 8 inches above roof membrane and 4 inches onto field of roof membrane.
- C. Mechanically fasten top of modified bituminous membrane base flashing securely at terminations and perimeter of roofing.
 - 1. Seal top termination of base flashing.

3.7 LIQUID FLASHING AT ROOF PENETRATIONS:

- A. SURFACE PREPARATION: Ensure that the modified membrane is clean, dry and free from dust, laitance, grease, oil and any other contaminants.
- B. Install liquid flashing system according to manufacturer's recommendations.
 - 1. Extend liquid flashing not less than 3 inches (76 mm) in all directions from edges of item being flashed.
 - 2. Embed granules, matching color of roof membrane, into wet compound.

3.8 WALKWAY INSTALLATION:

- A. Walkway Cap Sheet Strips: Install roofing membrane walkway cap sheet strips over roofing membrane by torch application, or set in 5inch squares of roof cement.

3.9 FIELD QUALITY CONTROL:

- A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 - 1. Notify Architect and Owner 48 hours in advance of the date and time of inspection.

3.10 PROTECTING AND CLEANING:

- A. Protect modified bituminous membrane roofing from damage and wear during remainder of construction period. When remaining construction will 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 modified bituminous roofing that does not comply with requirements, repair substrates, reinstall roofing, and repair base flashings to a condition free of damage and deterioration at the 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.

3.11 ROOFING INSTALLER'S WARRANTY:

- A. WHEREAS <NAME> of <ADDRESS>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner:
 - 2. Address:
 - 3. Building Name/Type:
 - 4. Address:
 - 5. Area of Work:
 - 6. Acceptance Date:
 - 7. Warranty Period:
 - 8. Expiration Date:
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. peak gust wind speed exceeding 72 mph;
 - c. fire;
 - d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;

- e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. vapor condensation on bottom of roofing; and
 - g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
- 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof has been paid by Owner or by another responsible party so designated.
 - 3. The Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents, resulting from leaks or faults or defects of work.
 - 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void, unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 - 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 - 6. The Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
 - 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this <DAY> day of <MONTH>, 20<YEAR>.

- 1. Authorized Signature:
- 2. Name:
- 3. Title:

END OF SECTION 075216

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes sheet metal flashing and trim in the following categories:
 - 1. Exposed trim.
 - 2. Metal flashing.
 - 3. Metal counterflashing and base flashing.
 - 4. Roof-drainage systems.

- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 07 Section "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Roofing" for installing sheet metal flashing and trim integral with membrane roofing.
 - 2. Division 07 Section "Roof Specialties" for formed aluminum fascia and coping systems.
 - 3. Division 07 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
 - 4. Division 07 Section "Joint Sealants" for elastomeric sealants.
 - 5. Division 07 Roofing Sections for flashing and roofing accessories installed integral with roofing membrane as part of roofing-system work.

1.3 PERFORMANCE REQUIREMENTS:

- A. General: Sheet metal flashing and trim assemblies as indicated 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.

1.4 SUBMITTALS:

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

- B. Product Data including manufacturer's material and finish data, installation instructions, and general recommendations for each specified flashing material and fabricated product.

- C. Shop Drawings of each item specified showing layout, profiles, methods of joining, and anchorage details.

- D. Samples of sheet metal flashing, trim, and accessory items, in the specified finish. Where finish involves normal color and texture variations, include Sample sets composed of 2 or more units showing the full range of variations expected.
 - 1. 8-inch- square Samples of specified sheet materials to be exposed as finished surfaces.
 - 2. 12-inch- long Samples of factory-fabricated products exposed as finished Work. Provide complete with specified factory finish.

- E. Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE:

- A. Mockups: Prior to installing sheet metal flashing and trim, construct mockups indicated to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for final unit of Work.
 - 1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect one week in advance of the dates and times when mockups will be constructed.
 - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Construct mockups for the following type of sheet metal flashing and trim:
 - a. Gutters and downspouts.
 - b. Conductor heads.
 - c. Exposed trim, flashings, and concealed flashings.
 - d. For Each Worker: Soldered samples of laps and end dams to be reviewed and approved by Architect and Commissioning Agent.
 - 5. Obtain Architect's approval of mockups before start of final unit of Work.
 - 6. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. When directed, demolish and remove mockups from Project site.
 - 7. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS:

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

PART 2 - PRODUCTS

2.1 METALS:

- A. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Revere Copper Products, Inc.; FreedomGray, or equal.
- B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability of alloy and temper designated below:
 - 1. High-Performance Organic Finish: AA-C12C42R1x Organic Coating: as specified below. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.
 - 1) Color: Custom. Match Architect's sample.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: 2D (dull, cold rolled).

2.2 MISCELLANEOUS MATERIALS AND ACCESSORIES:

- A. Solder for Zinc-Tin Alloy-Coated Copper: ASTM specification B32 and shall be pure tin OR lead-free, high-tin. Solder containing lead will not be allowed.
- B. Fasteners: Same metal as sheet metal flashing or other noncorrosive metal as recommended by sheet metal manufacturer. Match finish of exposed heads with material being fastened.
- C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- E. Elastomeric Sealant: Generic type recommended by sheet metal manufacturer and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 7 Section "Joint Sealants."

- F. Adhesives: Type recommended by flashing sheet metal manufacturer for waterproof and weather-resistant seaming and adhesive application of flashing sheet metal.
- G. Paper Slip Sheet: 5-lb/square red rosin, sized building paper conforming to FS UU-B-790, Type I, Style 1b.
- H. Polyethylene Underlayment: ASTM D 4397, minimum 6-mil- thick black polyethylene film, resistant to decay when tested according to ASTM E 154.
- I. Gutter Screen: 1/4-inch hardware cloth installed in sheet metal frames. Fabricate screen and frame of same basic material as gutters and downspouts.
- J. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of Work, matching or compatible with material being installed; noncorrosive; size and thickness required for performance.
- K. Solder:
 - 1. For Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. For Zinc-Tin Alloy-Coated Copper: ASTM B 32, 100 percent tin, with 0% lead content as recommended by sheet metal manufacturer.
 - 3. Solder containing lead will not be allowed.
- L. Stainless Steel Downspout Boot: Stainless steel body and 5/16-inch diameter mounting hole for flathead anchor bolts.
 - 1. Product: Model 4" - 5"-26" Downspout Adaptor; Piedmont Pipe Downspout Adapters, tel:(877) 489-0911, or equal.
 - 2. Adaptor to transition from the 4inch by 5inch down spout to 4inch schedule 40 PVC adapter beneath the ground.
 - 3. Length: 26-inches.

2.3 FABRICATION, GENERAL:

- A. Sheet Metal Fabrication Standard: Fabricate sheet metal flashing and trim to comply with recommendations of SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of the item indicated.
- B. Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- C. Form exposed sheet metal Work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.

- D. Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 1. Seams for Aluminum: Apply EPDM strip across joint with adhesive or releasable tape, and cover with aluminum plate.
 - 2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- E. Expansion Provisions: Space movement joints at maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions in Work cannot be used or would not be sufficiently weatherproof and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- F. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
- G. Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- H. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- I. Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer.
 - 1. Size: As recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

2.4 SHEET METAL FABRICATIONS:

- A. General: Fabricate sheet metal items in thickness or weight needed to comply with performance requirements but not less than that listed below for each application and metal.
- B. Exposed Trim: Fabricate from the following material:
 - 1. Aluminum: 0.050 inch thick.
- C. Base Flashing: Fabricate from the following material:
 - 1. Zinc-Tin Alloy-Coated Copper: 16.0 oz./sq. ft. (0.0216" thick).
- D. Counterflashing: Fabricate from the following material:
 - 1. Zinc-Tin Alloy-Coated Copper: 16.0 oz./sq. ft. (0.0216" thick).
- E. Flashing Receivers: Fabricate from the following material:
 - 1. Zinc-Tin Alloy-Coated Copper: 16.0 oz./sq. ft. (0.0216" thick).

F. Equipment Support Flashing: Fabricate from the following material:

1. Zinc-Tin Alloy-Coated Copper: 16.0 oz./sq. ft. (0.0216" thick).

G. Roof-Penetration Flashing: Fabricate from the following material:

1. Zinc-Tin Alloy-Coated Copper: 16.0 oz./sq. ft. (0.0216" thick).

2.5 ROOF DRAINAGE SHEET METAL FABRICATIONS :

A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but 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.

1. Gutter Style: J.
2. Expansion Joints: Butt type.
3. Joints: Apply EPDM strip across joint with adhesive or releasable tape, and cover with aluminum plate.
4. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.
5. Gutters with Girth up to 15 Inches: Fabricate from the following material:
 - a. Aluminum: 0.0320 inch (0.81 mm) thick.
6. 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.
7. Gutters with Girth 21 to 25 Inches (530 to 640 mm): Fabricate from the following materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.
8. Gutters with Girth 26 to 30 Inches (660 to 760 mm): Fabricate from the following materials:
 - a. Aluminum: 0.063 inch (1.60 mm) thick.

B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Fabricate downspouts from the following material:
 - a. Aluminum: 0.063 inch thick.

- b. Basis-of-Design Product: Subject to compliance with requirements, provide Industrial Downspout, closed face version; Metal Era, or equal.
- C. 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.
- D. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
 - 1. Aluminum: 0.040 inch (1.02 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work.
 - 1. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL:

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.
 - 1. Coat side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.
- C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
- D. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and elastomeric sealant.

- E. 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.
 - 1. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.

- F. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

- G. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
 - 1. Aluminum: Use aluminum or stainless-steel fasteners.
 - 2. Tin-Zinc Alloy-Coated Copper: Use copper or stainless-steel fasteners.

- H. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tem edges of sheets to be soldered to a width of 1-1/2 inches except where pre-tinned surface would show in finished Work.
 - 1. Do not solder aluminum sheet.
 - 2. Copper Soldering: Tin uncoated copper surfaces at edges of sheets using solder recommended for copper work.
 - 3. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

- I. Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

- J. Roof-Drainage System: Install drainage items fabricated from sheet metal, with straps, adhesives, and anchors recommended by SMACNA's Manual or the item manufacturer, to drain roof in the most efficient manner. Coordinate roof-drain flashing installation with roof-drainage system installation. Coordinate flashing and sheet metal items for steep-sloped roofs with roofing installation.

- K. Equipment Support Flashing: Coordinate equipment support flashing installation with roofing and equipment installation. Weld or seal flashing to equipment support member.

- L. Roof-Penetration Flashing: Coordinate roof-penetration flashing installation with roofing and installation of items penetrating roof. Install flashing as follows:
 - 1. Turn copper flashing down inside vent piping, being careful not to block vent piping with flashing.
 - 2. Seal and clamp flashing to pipes penetrating roof, other than copper flashing on vent piping.

- M. Install continuous gutter screens on gutters with noncorrosive fasteners, arranged as hinged units to swing open for cleaning gutters.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION:

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.

- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with butyl sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 - 3. Anchor and loosely lock back edge of gutter to continuous apron flashing.
 - 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
 - 5. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion joint caps.
 - 6. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

- C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
 - 1. Provide elbows at base of downspout to direct water away from building.
 - 2. Connect downspouts to underground drainage system indicated.

- D. Splash Pans: Install where downspouts discharge on low-sloped roofs. Set in elastomeric sealant compatible with roofing membrane.

3.4 ROOF FLASHING INSTALLATION:

- A. General: Install sheet metal roof flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing, 8-inches minimum above roof membrane. Install stainless-steel draw band and tighten.

- C. 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 over base flashing, 8-inches minimum above roof membrane. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.
 - 1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:
 - 1. Seal with elastomeric sealant and clamp flashing to pipes penetrating roof.

3.5 WALL FLASHING INSTALLATION:

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

3.6 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.

3.7 CLEANING AND PROTECTION:

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- D. 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 077100

ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:

- ~~1. Fascia system.~~
- 2. Coping system.
- ~~3. Roof-drainage systems.~~

- B. Related Sections include the following:

- 1. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated metal flashing and counterflashing, gutters and downspouts, trim and fascia units, roof expansion-joint covers, and miscellaneous sheet metal accessories.

1.3 SUBMITTALS:

- A. Product Data: For each type of product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: Indicate layout, joining, profiles, accessories, anchorage, flashing connections, and relationship to supporting structure and to adjoining roof and wall construction.
- C. Samples for Initial Selection: Manufacturer's sample finishes showing the full range of colors and textures available for units with factory-applied color finishes.
- D. Samples for Verification: For copings, and roof-edge flashings made from 12-inch (300-mm) lengths of full-size components including fasteners, cover joints, accessories, and attachments.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for copings and roof-edge flashings.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Provide manufactured roof specialties capable of withstanding wind loads, structural movement, thermally induced movement, and exposure to weather without failing.

- B. Edge securement for low-slope roofs. Low-slope membrane roof systems metal edge securement, except gutters, installed in accordance with Oklahoma State Building Code Section 1504, shall be designed in accordance with ANSI/SPRI ES-1, except the basic wind speed shall be as follows:
 - 1. Wind Speed: 120 mph.
- C. Cladding components shall be designed and anchored to resist wind-induced overturning, uplift and sliding in accordance with Oklahoma State Building Code Paragraph 1609.1.3.
 - 1. Wind Speed: 120 mph.

1.5 QUALITY ASSURANCE:

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical roof edge, including fascia, gutter and downspout, approximately 10 feet (3.0 m) long, including supporting construction, seams, attachments, underlayment, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects roof specialties including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

1.7 WARRANTY:

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Formed-Aluminum Roof Edge Flashings/Copings:
 - a. ABC Seamless, Inc.
 - b. Architectural Products Co.
 - c. ATAS International, Inc.
 - d. Cheney Flashing Company.
 - e. Hickman: W.P. Hickman Co.
 - f. Merchant and Evans, Inc.
 - g. Metal-Era, Inc
 - h. MM Systems Corp.
 - i. Petersen Aluminum Corp.
 - j. Southern Aluminum Finishing Co.
 - 2. Products manufactured by Metal-Era are specified. Items designated establish minimum requirements for design and performance of equipment required by this Section.

2.2 METALS:

- A. Aluminum Extrusions: ASTM B 221, 6063-T5 alloy and temper, or as recommended by manufacturer for use intended and as required for proper application of finish indicated.
- B. Aluminum Sheet: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for use intended and finish indicated, and with not less than the strength and durability of alloy and temper designated below:
 - 1. Alloy 3003-H14, with a minimum thickness of 0.040 inch, unless otherwise indicated, for aluminum sheet with mill finish.

- ~~C. Gutter Screen: 1/4-inch hardware cloth installed in sheet metal frames. Fabricate screen and frame of same basic material as gutters and downspouts.~~

2.3 ROOF-EDGE FLASHINGS:

- ~~A. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.~~
 - ~~1. Basis-of-Design Product: Subject to compliance with requirements, provide Model #AF-70, Anchor-Tite Standard Fascia; Metal-Era, or one of the listed manufacturers.~~
 - ~~2. Height: 7 inches.~~
 - ~~3. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12 feet 0 inches (3.65 m) standard lengths with pre-punched slotted holes. All bar miters are welded.~~
 - ~~a. Injection Molded EPDM Bar Splice to allow thermal movement expansion of extruded aluminum anchor bar.~~
 - ~~b. Fasteners: 2 inch (51 mm) stainless steel with driver.~~
 - ~~4. Fascia Cover: Fabricated from the following exposed metal:~~
 - ~~a. Formed Aluminum: 0.050 inch (1.270 mm) thick.~~
 - ~~b. Finish: Two-coat fluoropolymer.~~
 - ~~5. Corners: Factory mitered and continuously welded.~~
 - ~~6. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.~~

2.4 COPING:

- A. Coping: Manufactured coping system consisting of decorative formed-metal coping cap with continuous galvanized steel anchor/support in section lengths not exceeding 12 feet (3.6 m), concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
 - 1. Basis-of-Design Product: **Perma-Tite Gold Coping; Metal-Era**, tel: 604-689-0188, or one of the listed manufacturers.
 - a. Coping-Cap Material: Formed aluminum, 0.063 inch (1.60 mm) thick, or as required to meet performance requirements.
 - b. Finish: Custom, two-coat fluoropolymer.
 - 2. Fascia vertical face and coping back leg manufactured to job requirements.
 - 3. Corners: Factory mitered, welded and finished.
 - 4. Concealed splice plates: 8 inch (203 mm) wide. Finish to match finish of coping cap with factory applied dual non-curing sealant strips.
 - 5. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material. Mechanically fastened as indicated and detailed.

6. Snap-on-Coping Anchor Plates: Concealed, 16 ga. galvanized-steel sheet, nominal 12 inches (300 mm) wide, with integral stainless steel spring cleats.

~~B. Gutters: Manufactured, in section lengths not exceeding 12 feet (3.6 m):~~

- ~~1. Basis-of-Design Product: Subject to compliance with requirements, provide Type IG1-C8, with flange, Metal-Era, or one of the listed manufacturers.~~
- ~~2. Height: As indicated on the Drawings.~~
- ~~3. Length: As indicated on Drawings.~~
- ~~4. Gutter Straps: 2" x .100 Mill. Preslotted holes in gutter straps.~~
- ~~5. Aluminum: Formed Aluminum: 0.050 inch (1.27 mm) thick.~~
 - ~~a. Color: Match standing seam roofing.~~
 - ~~b. Configuration: Match drawing.~~
 - ~~c. Provide custom welded miters.~~
- ~~6. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen.~~

~~C. Downspouts: Manufactured, in section lengths not exceeding 12 feet (3.6 m):~~

- ~~1. Basis-of-Design Product: Subject to compliance with requirements, provide Industrial Downspouts, Metal-Era, or one of the listed manufacturers.~~
- ~~2. Size: 3" x 4".~~
- ~~3. Wall Brackets.~~
- ~~4. Length: As indicated on Drawings.~~
- ~~5. Aluminum: Formed Aluminum: 0.050 inch (1.27 mm) thick.~~
 - ~~a. Color: Match Gutters.~~
 - ~~b. Configuration: Match drawing.~~
 - ~~c. Provide custom welded miters.~~

2.5 ACCESSORIES:

- A. General: Provide manufacturer's standard accessories designed and manufactured to match and fit roof edge treatment system indicated.
- B. Concealed Fasteners: Same metal as item fastened or other noncorrosive metal as recommended by manufacturer.
- C. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coat.
- D. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- E. Foam-Rubber Seal: Manufacturer's standard foam.

- F. Adhesives: Type recommended by manufacturer for substrate and project conditions, and formulated to withstand minimum 60-lbf/sq. ft. wind-uplift force.

2.6 FINISHES, GENERAL:

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Finish manufactured roof specialties after fabrication and assembly if products are not fabricated from prefinished metals.
- D. 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 unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES:

- A. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- B. High-Performance Organic Coating Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating or resin manufacturer's written instructions.
 - 1. Fluoropolymer 2-Coat Coating System: Manufacturer's standard 2-coat, thermocured system composed of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 1402, Test Method 7.
 - a. Color and Gloss: Custom color. Match Architect's sample.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine walls, roof edges, and parapets for suitable conditions for roof edge system installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Promptly remove protective film, if any, from exposed surfaces of finished metals. Strip with care to avoid damage to finish.

- B. Prepare concrete, concrete masonry block, and similar surfaces to receive roof edge system specified. Install blocking, cleats, water dams, and other anchoring and attachment accessories and devices required.

3.3 INSTALLATION:

- A. General: Comply with manufacturer's written installation instructions. Coordinate with installation of roof deck and other substrates to receive work of this Section and with vapor retarders, roofing insulation, roofing membrane, flashing, and wall construction, as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor products securely to structural substrates to withstand lateral and thermal stresses and inward and outward loading pressures.
- B. Isolation: Where metal surfaces of units contact dissimilar metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces or provide other permanent separation as recommended by aluminum producer.
- C. Expansion Provisions: Install running lengths to allow controlled expansion for movement of metal components in relation not only to one another but also to adjoining dissimilar materials, including flashing and roofing membrane materials, in a manner sufficient to prevent water leakage, deformation, or damage.

3.4 ROOF-EDGE FLASHING INSTALLATION:

- A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

~~3.5 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 joints sealed with sealant, and in accordance with manufacturer's details. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.~~
 - ~~1. Fasten gutter straps to front and back of gutter.~~
 - ~~2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.~~

- ~~C. 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.~~
- ~~D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with the substrate.~~

3.6 CLEANING AND PROTECTING:

- A. Clean exposed metal surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.
- B. Protection: Provide protective measures as required to ensure work of this Section will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION 077100

SECTION 077129

MANUFACTURED ROOF EXPANSION JOINTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

A. Section Includes:

- 1. Aluminum roof expansion joints.
 - a. Roof to wall.

B. Related Requirements:

- 1. Division 06 Section "Miscellaneous Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
- 2. Division 07 Section "Styrene-Butadiene-Styrene (SBS) Modified Bituminous Roofing."
- 3. Division 07 Section "Sheet Metal Flashing and Trim" for shop- and field-fabricated sheet metal expansion-joint systems, flashing, and other sheet metal items.
- 4. Division 07 Section "Roof Accessories" for manufactured and prefabricated metal roof curbs.

1.3 PREINSTALLATION MEETINGS:

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

1.4 ACTION SUBMITTALS:

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

B. Shop Drawings: For roof expansion joints.

- 1. Include plans, elevations, sections, and attachment details.
- 2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
- 3. Provide isometric drawings of intersections, terminations, and changes in joint direction or planes, depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.

- C. Samples: For each exposed product and for each color specified, 6 inches (150 mm) in size.

1.5 INFORMATIONAL SUBMITTALS:

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

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: Installer of roofing membrane.

1.7 WARRANTY:

- A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than five Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. General: Roof expansion joints shall withstand exposure to weather, remain watertight, and resist the movements indicated without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Fire-Test-Response Characteristics: Provide fire-barrier assemblies with fire-test-response characteristics as determined by testing identical products, per test method indicated, by UL or another testing agency acceptable to authorities having jurisdiction. Assemblies shall be capable of anticipated movement while maintaining fire rating. Fire-barrier products shall bear classification marking of qualified testing agency.

2.2 ALUMINUM ROOF EXPANSION JOINTS:

- A. Aluminum Roof Expansion Joint: Manufactured, continuous, waterproof, joint-cover assembly; consisting of a formed or extruded metal cover secured to extruded aluminum frames, with water-resistant gasketing between cover and frames, and with provision for securing assembly to substrate and sealing assembly to roofing membrane or flashing. Provide each size and type indicated, factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, and other components as recommended by roof-expansion-joint manufacturer for complete installation. Fabricate each assembly specifically for installation configuration indicated on Drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
 - b. Balco, Inc.
 - c. C/S Group.
 - d. InPro Corporation.
 - e. MM Systems Corporation.
 - f. Nystrom Building Products.
 - g. Watson Bowman Acme Corp.
 - 2. Joint Movement Capability: Plus and minus 25 percent of joint size.
 - 3. Frame Members: Extruded aluminum configured for curbs as indicated; with exposed finish matching cover.
 - 4. Cover: Formed or extruded aluminum; thickness as recommended by manufacturer.
 - a. Aluminum Finish: High-performance organic.
 - b. Aluminum Finish Color: White.
 - 5. Centering Devices: Centering bars.
 - 6. Secondary Seal: Continuous, waterproof PVC membrane within joint and attached to substrate on sides of joint below the cover.

- a. Thermal Insulation: Fill space above secondary seal with mineral-fiber blanket insulation; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84.
7. Fire Barrier: Manufacturer's standard fire-resistive joint system with ratings determined per ASTM E 1966 or UL 2079 to resist spread of fire and accommodate building thermal and seismic movements without impairing its ability to resist the passage of fire and hot gases.
 - a. Fire-Resistance Rating: Not less than 2-hour.
8. Basis of Design: Subject to compliance with requirements, provide the following:
 - a. **[REJ-1]** – C/S SRJW-300 W/FB. Parapet wall transitions to be provided. (roof/wall joint).

2.3 MATERIALS:

- A. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Aluminum: ASTM B 209 (ASTM B 209M) for sheet and plate, ASTM B 221 (ASTM B 221M) for extrusions; alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious or preservative-treated wood materials.
 2. Mill Finish: As manufactured.
- C. Adhesives: As recommended by roof-expansion-joint manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 1. Adhesives and sealants that are not on the exterior side of air barrier shall comply with Section 018113 Sustainable Design Requirements - Leed for New Construction and Major Renovations – New Construction.
- D. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- E. Mineral-Fiber Blanket: ASTM C 665.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine roof-joint openings, inside surfaces of parapets, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.
 - 1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
 - 2. Install roof expansion joints true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 3. Provide for linear thermal expansion of roof expansion joint materials.
 - 4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
 - 5. Provide uniform, neat seams.
 - 6. Install roof expansion joints to fit substrates and to result in watertight performance.
 - 7. Torch cutting of roof expansion joints is not permitted.
 - 8. Do not use graphite pencils to mark aluminum surfaces.
- B. Directional Changes and Other Expansion-Control Joint Systems: Coordinate installation of roof expansion joints with other expansion-control joint systems to result in watertight performance. Install factory-fabricated units at directional changes and at transitions between roof expansion joints and exterior expansion-control joint systems specified in Division 07 Section "Expansion Control" to provide continuous, uninterrupted, and watertight joints.
- C. Splices: Splice roof expansion joints with materials provided by roof-expansion-joint manufacturer for this purpose, to provide continuous, uninterrupted, and waterproof joints.
 - 1. Install waterproof splices and prefabricated end dams to prevent leakage of secondary-seal membrane.
- D. Fire Barrier: Install fire barrier where indicated to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.

- E. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

3.3 PROTECTION:

- A. Protect roof expansion joints from foot traffic, displacement, or other damage.
- B. Remove and replace roof expansion joints and components that become damaged by moisture or otherwise.

END OF SECTION 077129

SECTION 078100

APPLIED FIREPROOFING

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Sprayed fire-resistive materials.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 078123 "Intumescent Fireproofing."
 - 2. Division 07 Section "Penetration Firestopping" for fire-resistance-rated firestopping systems.
 - 3. Division 07 Section "Joint Firestopping" for fire-resistance-rated joint systems.

1.3 SUBMITTALS:

- A. Product data for each sprayed-on fireproofing product indicated.
- B. Shop drawings in form of structural framing plans indicating the following:
 - 1. Where and what kinds of surface preparations are required before applying fireproofing.
 - 2. Extent of sprayed-on fireproofing for each different construction and fire-resistance rating including the following:
 - a. Applicable fire-resistive design designations of inspecting and testing agency acceptable to authorities having jurisdiction.
 - b. Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
 - 3. Treatment of fireproofing after its application.
- C. Test reports for sprayed-on fireproofing from a qualified independent testing agency employed and paid by Contractor or manufacturer. Provide reports indicating that physical properties of proposed sprayed-on fireproofing products comply with specified requirements based on comprehensive testing of current product formulations according to the following requirements:
 - 1. Testing is performed on sprayed-on fireproofing materials randomly selected from bags bearing the applicable classification marking of UL or another inspecting and testing agency acceptable to authorities having jurisdiction.

2. Testing is performed on specimens of sprayed-on fireproofing materials that comply with laboratory testing requirements specified in Part 2 and are otherwise identical in every respect to installed fireproofing including application of sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
 3. Qualified independent testing agency does testing on laboratory specimens that it witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
 - a. Test reports without the above information are not acceptable.
- D. Product certificates from fireproofing manufacturers that each sprayed-on fireproofing product indicated for Project complies with specified requirements including those for fire-test-response characteristics and compatibility with adhesives, primers, and other surface coatings on substrates indicated to receive fireproofing.
- E. Results from tests and inspections performed by Owner-employed independent testing agency will be reported promptly to Architect and Contractor.
- F. Qualification data for firms and persons specified in "Quality Assurance" article to demonstrate their capabilities and experience. Include list of completed projects with project names, addresses, names of Architects and Owners, and other information specified.
- G. Research reports or evaluation reports of the model code organization acceptable to authorities having jurisdiction showing that sprayed-on fireproofing products comply with building code in effect for Project.

1.4 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: Provide sprayed-on fireproofing products identical to those used in assemblies tested for the following fire-test-response characteristics, per test method indicated below, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify packages (bags) containing fireproofing with appropriate classification markings of applicable testing and inspecting agency.
1. Fire-Resistance Ratings: As indicated by reference to fire-resistive designs listed in UL "Fire Resistance Directory," or in the comparable publication of another testing and inspecting agency acceptable to authorities having jurisdiction, for fire-resistive assemblies where sprayed-on fireproofing serves as direct-applied protection, tested per ASTM E 119.
 2. Surface-Burning Characteristics: As indicated for each sprayed-on fireproofing product required, tested per ASTM E 84.
- B. Installer Qualifications: Engage an experienced Installer certified, licensed, or otherwise qualified by the sprayed-on fireproofing manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its sprayed-on fireproofing products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.

- C. Single-Source Responsibility: Obtain sprayed-on fireproofing materials from a single manufacturer for each different product required.
- D. Owner will employ and pay a qualified independent testing agency to perform field quality-control testing services specified in Part 3 of this Section.
- E. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency hired by Contractor or manufacturer to test sprayed-on fireproofing products must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to conduct satisfactorily the testing indicated.
- F. Provide fireproofing products containing no detectable asbestos as determined according to the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, Polarized Light Microscopy.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; shelf life, if applicable; and fire-resistance ratings applicable to Project.
- B. Use materials with limited shelf life within period indicated. Remove from Project site and discard any materials whose shelf life has expired.
- C. Store sprayed-on fireproofing materials inside, under cover, above ground, so they are kept dry until ready for use. Remove from Project site and discard any materials that have deteriorated.

1.6 PROJECT CONDITIONS:

- A. Environmental Conditions: Do not install sprayed-on fireproofing when ambient or substrate temperatures are 40 deg F (4.4 deg C) and falling, unless temporary protection and heat is provided to maintain temperatures at or above this level for 24 hours before, during, and for 24 hours after applying sprayed-on fireproofing.
- B. Ventilation: Ventilate sprayed-on fireproofing by natural means or, where this is inadequate, forced-air circulation during and after application until fireproofing dries thoroughly.

1.7 SEQUENCING:

- A. Sequence and coordinate application of sprayed-on fireproofing with other related work specified in other Sections to comply with the following requirements:
 - 1. Provide temporary enclosures to prevent deterioration of sprayed-on fireproofing for interior applications due to exposure to unfavorable environmental conditions.
 - 2. Avoid unnecessary exposure of sprayed-on fireproofing to abrasion and other damage likely to occur during construction operations subsequent to its application.
 - 3. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

4. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until fireproofing is installed.
5. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, tested, and corrections have been made to any defective fireproofing.

PART 2 - PRODUCTS

2.1 SPRAYED FIRE-RESISTIVE MATERIALS:

- A. General: Provide manufacturer's standard products complying with requirements indicated for material composition and for minimum physical properties of each product listed, measured by standard test methods referenced with each property.
- B. Cementitious Fireproofing: Factory-mixed, dry formulation mixed with water at Project site to form a slurry or mortar for conveyance and application, complying with the following requirements:
 1. Material Composition: Cement-aggregate formulation, chloride free, composed of portland cement, additives, and inorganic aggregates.
 2. Bond Strength: 434 lbf per sq. ft. as determined per ASTM E 736.
 3. Compressive Strength: 50 lbf per sq. inch as determined per ASTM E 761.
 4. Dry Density: Values for average and individual densities as required for fire-resistance ratings indicated, as determined per ASTM E 605 or Appendix A "Alternate Method for Density Determination" of AWC Technical Manual 12-A, but with an average density of not less than 22 pcf.
 5. Corrosion Resistance: No evidence of corrosion as determined per ASTM E 937.
 6. Deflection: No cracking, spalling, delamination or the like as determined per ASTM E 759.
 7. Air Erosion: Maximum weight loss of 0.025 gram per sq. ft. as determined per ASTM E 859.
 8. Combustion Characteristics: Passes ASTM E 136.
 9. Surface-Burning Characteristics: Maximum flame-spread value of 5 and smoke-developed value of 0.
- C. Products: Subject to compliance with requirements, provide one of the following:
 1. Cementitious Sprayed Fire-Resistive Material:
 - a. Pyrolite 22; Carbolite Co., Fireproofing Products Div.
 - b. Monokote Type Z106/HY; GCP Applied Technologies.
 - c. 7GP; A/D Fire Protection Systems.
 - d. CAFCO 400; Isolatek International.

2.2 AUXILIARY FIREPROOFING MATERIALS:

- A. General: Provide auxiliary fireproofing materials that are compatible with sprayed-on fireproofing products and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in the fire-resistive designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
 - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates with Installer present to determine if they are in satisfactory condition to receive sprayed-on fireproofing. A substrate is in satisfactory condition if it complies with the following:
 - 1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
 - 2. Substrates are free of oil, grease, rolling compounds, incompatible primers, loose mill scale, dirt, or other foreign substances capable of impairing bond of fireproofing with substrate under conditions of normal use or fire exposure.
 - 3. Objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying the fireproofing.

- B. The steel has been coated with paint primer. The coating supplier should also certify the compatibility of the primer with portland cement based fireproofing. An on-site mock-up and bond test shall be performed on all unknown or un tested coatings prior to application of fireproofing to determine compatibility. The use of primer coatings with fireproofing is detailed in the UL Fire Resistance Directory and may require the use of bonding agents or mechanical attachment on beams, columns, tube and pipe steel to maintain the fire-resistive rating.
- C. Conduct tests according to sprayed-on fireproofing manufacturer's recommendations to verify that substrates are free of oil, rolling compounds, and other substances capable of interfering with bond where there is any doubt as to their presence.
- D. Do not proceed with installation of fireproofing until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Clean substrates of substances that could impair bond of fireproofing, including oil, grease, rolling compounds, incompatible primers, and loose mill scale.
- B. Repair substrates to remove any surface imperfections that could affect uniformity of texture and thickness in finished fireproofing surface. Remove minor projections and fill voids that would telegraph through fireproofing after application.
- C. Cover other work subject to damage from fall-out or overspray of fireproofing materials during application. Provide temporary enclosure as required to confine spraying operations, protect the environment, and ensure maintaining adequate ambient conditions for temperature and ventilation.

3.3 INSTALLATION, GENERAL:

- A. Refer to Structural Drawings to show extent of spray-on fireproofing.
- B. Comply with fireproofing manufacturer's instructions for mixing materials, application procedures, and types of equipment used to convey and spray on fireproofing materials; as applicable to the particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Apply sprayed-on fireproofing that is identical to products tested as specified in Part 1 under "Test Reports" in "Submittals" article, with respect to rate of application, use of sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.
- D. Extend fireproofing in full thickness over entire area of each substrate to be protected. Unless otherwise recommended by fireproofing manufacturer, install body of fireproof covering in a single course.

- E. Apply fireproofing materials by sprayed-on method to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended by manufacturer.

3.4 INSTALLING SPRAYED FIRE-RESISTIVE MATERIALS:

- A. Apply fireproofing in thicknesses and densities indicated but not less than that required to achieve fire-resistance ratings designated for each condition, unless greater thicknesses and densities are indicated.
- B. Provide a uniform finish complying with description indicated for each type of material.
- C. Apply cement-aggregate cementitious fireproofing to produce the following finish:
 - 1. Spray textured finish with no further treatment.

3.5 FIELD QUALITY CONTROL:

- A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality-control testing.
- B. Extent and Testing Methodology: Testing of completed fireproofing will take place in successive stages in areas of extent described below; do not proceed with fireproofing of next area until test results for previously completed fireproofing show compliance with requirements.
 - 1. Extent of Each Test Area: Each bay, 10,000 sq. ft. of floor area, or total floor area, whichever produces greatest number of test areas.
 - 2. Within each area, testing agency will randomly select one structural member of each type (primary beam, secondary beam, joist, truss, steel deck, and column) and test fireproofing as follows:
 - a. For cohesion and adhesion per ASTM E 736.
 - b. For thickness per ASTM E 605.
 - c. Lower flanges and webs of beams, column webs, column flanges, and floor deck for density per ASTM E 605 or Appendix A "Alternate Method for Density Determination" of AWC Technical Manual 12-A.
 - d. When testing discovers fireproofing not in compliance with requirements, testing agency will perform additional random testing to determine extent of noncompliance.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace fireproofing where test results indicate that it does not comply with specified requirements for cohesion and adhesion or for density or both.
- E. Apply additional fireproofing per manufacturer's directions where test results indicate that the thickness does not comply with specified requirements.

- F. Additional Testing: Where fireproofing is removed and replaced or repaired, additional testing will be performed to determine compliance with specified requirements.

3.6 CLEANING, REPAIR, AND PROTECTION:

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material over-spray and fall-out from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Cure cementitious fireproofing materials according to fireproofing manufacturer's recommendations to prevent premature drying.
- C. Protect fireproofing, according to advice of fireproofing manufacturer and Installer, from damage resulting from construction operations or other causes so that fireproofing will be without damage or deterioration at time of Substantial Completion.
- D. Coordinate installation of fireproofing with other construction to minimize the need to cut or remove fireproofing. As installation of other construction proceeds, inspect fireproofing and patch any areas where fireproofing was removed or damaged.
- E. Repair or replace work that has not been successfully protected.

END OF SECTION 078100

SECTION 078123

INTUMESCENT FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes mastic and intumescent fire-resistive coatings for exterior applications.
- B. Related Requirements:
 - 1. Section 078100 "Applied Fireproofing" for sprayed fire-resistive materials (SFRM).
 - 2. Section 078413 "Penetration Firestopping" for fire-resistance-rated firestopping systems.
 - 3. Section 078443 "Joint Firestopping" for fire-resistance-rated joint systems.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Product Data: For paints and coatings, indicating VOC content.
 - 2. Laboratory Test Reports: For paints and coatings, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: Framing plans or schedules, or both, indicating the following:
 - 1. Extent of fireproofing for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of fireproofing after application.

- D. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard dimensions.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of each type of fireproofing and different substrate and each required finish as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 50 deg F (10 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.

- B. Source Limitations: Obtain fireproofing for each fire-resistance design from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. VOC Content: For field applications, coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
- E. Low-Emitting Materials: Coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. Asbestos: Provide products containing no detectable asbestos.

2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

- A. Mastic and Intumescent Fire-Resistive Coating: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Albi Manufacturing, a division of StanChem, Inc.; Albi Clad 800.
 - b. Carboline Company, a subsidiary of RPM International; Nullifire S605.
 - c. International Protective Coatings; Chartek 7.
 - d. Isolatek International; Cafco SprayFilm-WB 4.
 - 2. Application: Designated for "exterior" use by a qualified testing agency acceptable to authorities having jurisdiction.
 - 3. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
 - 4. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
 - 5. Hardness: Not less than 65, Type D durometer, according to ASTM D 2240.

- 6. Finish: Rolled, spray-textured finish.
 - a. Color and Gloss: Custom color, Match Architect's sample.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer and complying with required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- D. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
- E. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.
 - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
 - 2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 - 3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- 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. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
 - 1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- E. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- F. Extend fireproofing in full thickness over entire area of each substrate to be protected.

- G. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- H. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- I. Cure fireproofing according to fireproofing manufacturer's written instructions.
- J. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- K. Finishes: Where indicated, apply fireproofing to produce the following finishes:
 - 1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
 - 2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
 - 3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Test and inspect as required by the IBC, Subsection 1705.14, "Mastic and Intumescent Fire-Resistant Coatings."
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fireproofing will be considered defective if it does not pass tests and inspections.
 - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
 - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING, PROTECTING, AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

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

END OF SECTION 078123

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.
- 3. Penetrations in smoke barriers.

B. Related Requirements:

- 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 PREINSTALLATION MEETINGS:

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

1.4 ACTION SUBMITTALS:

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

- B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

- 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.5 INFORMATIONAL SUBMITTALS:

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS:

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 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 its "Qualified Firestop Contractor Program Requirements."

1.8 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.9 COORDINATION:

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Fire-Test-Response Characteristics:
 - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

- 3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS:

- A. Penetration Firestopping Systems: Systems that resist spread of fire, 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.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Grabber Construction Products.
 - d. Hilti, Inc.
 - e. HOLDRITE.
 - f. NUCO Inc.
 - g. Passive Fire Protection Partners.
 - h. RectorSeal.
 - i. Specified Technologies, Inc.
 - j. Tremco, Inc.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.

- F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.

- G. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- H. 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 system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

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 sleeve lined with an intumescent strip, a 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. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

- G. 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.

- H. 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.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING:

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system 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: Before installing penetration firestopping systems, clean out openings immediately 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 materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION:

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- 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.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 - 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. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
 - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL:

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION:

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system 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 systems are 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 material and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SYSTEM 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 Group-listed systems are indicated, they refer to design numbers in Intertek Group'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. Penetration Firestopping Systems with No Penetrating Items[**FS-1**]:
 - 1. UL-Classified Systems: W-L-]0016.
 - 2. F-Rating: 1 hour and 2 hours.
 - 3. T-Rating: 1 hour and 2 hours.
 - 4. L-Rating at Ambient: Less than 1cfm/sq. ft. (cu. m/s per sq. m).
 - 5. L-Rating at 400 Deg F (204 Deg C): Less than 1 cfm/sq. ft. (cu. m/s per sq. m)>.
 - 6. W-Rating: No leakage of water at completion of water leakage testing.
 - 7. Type of Fill Materials: As required to achieve rating.
- E. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing [**FS-2**]:
 - 1. UL-Classified Systems: W-L-1029.
 - 2. F-Rating: 1 hour and 2 hours.

3. T-Rating: 0 hour.
4. L-Rating at Ambient: Less than 1cfm/sq. ft. (cu. m/s per sq. m).
5. L-Rating at 400 Deg F (204 Deg C): Less than 1 cfm/sq. ft. (cu. m/s per sq. m).
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

F. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing [**FS-3**]:

1. UL-Classified Systems: W-L-2046.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 1/2 hour.
4. L-Rating at Ambient: Less than 1cfm/sq. ft. (cu. m/s per sq. m).
5. L-Rating at 400 Deg F (204 Deg C): Less than 1cfm/sq. ft. (cu. m/s per sq. m).
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

G. Penetration Firestopping Systems for Electrical Cables [**FS-4**]:

1. UL-Classified Systems: W-L-3210.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 3/4 hour.
4. L-Rating at Ambient: N/A.
5. L-Rating at 400 Deg F (204 Deg C): N/A.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

H. Penetration Firestopping Systems for Cable Trays with Electric Cables [**FS-5**]:

1. UL-Classified Systems: W-L-4005.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 0 hour.
4. L-Rating at Ambient: N/A.
5. L-Rating at 400 Deg F (204 Deg C): N/A.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

I. Penetration Firestopping Systems for Insulated Pipes [**FS-6**]:

1. UL-Classified Systems: W-L-5159.
2. F-Rating: 3 hour and 4hours.
3. T-Rating: 1-1/2 hour.
4. L-Rating at Ambient: Less than 1cfm/sq. ft. (cu. m/s per sq. m).
5. L-Rating at 400 Deg F (204 Deg C): Less than 1cfm/sq. ft. (cu. m/s per sq. m).
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

J. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants [FS-7]:

1. UL-Classified Systems: W-L- 6001.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 0 hours.
4. L-Rating at Ambient: Less than 1cfm/sq. ft. (cu. m/s per sq. m).
5. L-Rating at 400 Deg F (204 Deg C): Less than 1cfm/sq. ft. (cu. m/s per sq. m).
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

K. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrants [FS-8]:

1. UL-Classified Systems: W-L- 7029.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 1/4 hour.
4. L-Rating at Ambient: N/A.
5. L-Rating at 400 Deg F (204 Deg C): N/A.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

L. Penetration Firestopping Systems for Groupings of Penetrants [FS-9]:

1. UL-Classified Systems: W-L-8011.
2. F-Rating: 1 hour and 2 hours.
3. T-Rating: 1/2 hour.
4. L-Rating at Ambient: N/A.
5. L-Rating at 400 Deg F (204 Deg C): N/A.
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating.

END OF SECTION 078413

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.
- 2. Joints in smoke barriers.

B. Related Requirements:

- 1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
- 2. Section 079500 "Expansion Control" for fire-resistive architectural joint systems.
- 3. Section 092216 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

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. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

- 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.5 INFORMATIONAL SUBMITTALS:

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS:

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.7 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."

1.8 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.9 COORDINATION:

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.

2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS:

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping 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 joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Grabber Construction Products.
 - d. Hilti, Inc.
 - e. Nelson Firestop; a brand of Emerson Industrial Automation.
 - f. NUCO Inc.
 - g. Passive Fire Protection Partners.
 - h. RectorSeal.
 - i. Specified Technologies, Inc.
 - j. Thermafiber, Inc.; an Owens Corning company.
 - k. Tremco, Inc.
 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. A/D Fire Protection Systems Inc.
 - c. Hilti, Inc.
 - d. Nelson Firestop; a brand of Emerson Industrial Automation.
 - e. NUCO Inc.
 - f. Passive Fire Protection Partners.
 - g. RectorSeal.

- h. Specified Technologies, Inc.
 - i. Thermafiber, Inc.; an Owens Corning company.
 - j. Tremco, Inc.
2. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:
- 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Low-Emitting Materials: Fire-resistive joint system sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- G. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions 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: Before installing fire-resistive joint systems, clean joints immediately 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 elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.

- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION:

- A. General: Install 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 elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION:

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of the end of each wall and at intervals not exceeding 30 feet (914.4 cm) measured horizontally along the wall or partition so labels are visible to anyone seeking to remove or modify joint firestopping system. Lettering shall not be less than 3 inches (76 mm) in height with a 3/8 inch (9.5 mm) stroke in contrasting color. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL:

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION:

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

3.7 JOINT FIRESTOPPING 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. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under product category Expansion/Seismic Joints or Firestop Systems.
- C. Floor-to-Wall, Fire-Resistive Joint System **FRJS-1**:
 - 1. Basis-of-Design UL-Classified Product: FW-D-0005.
 - 2. Assembly Rating: 2 hours.
 - 3. Joint Width: One inch.
 - 4. Movement Capabilities: Class II - 12½ percent compression or extension.
- D. Head-of-Wall, Fire-Resistive Joint System **FRJS-2**:
 - 1. Basis-of-Design UL-Classified Product: HW-D-0034.
 - 2. Assembly Rating: 2 hours.
 - 3. Joint Width: One inch.
 - 4. Movement Capabilities: Class II - 25 percent compression or extension.
- E. Head-of-Wall, Fire-Resistive Joint System **FRJS-3**:
 - 1. Basis-of-Design UL-Classified Product: HW-D-0039.

2. Assembly Rating: 2 hours.
3. Joint Width: One inch.
4. Movement Capabilities: Class II - 25 percent compression or extension.

F. Head-of-Wall, Fire-Resistive Joint System **FRJS-4**:

1. Basis-of-Design UL-Classified Product: HW-D-0099.
2. Assembly Rating: 2 hours.
3. Joint Width: One inch.
4. Movement Capabilities: Class II - 18¾ percent compression or extension.

G. Wall-to-Wall, Fire-Resistive Joint System **FRJS-5**:

1. Basis-of-Design UL-Classified Product: WW-D-0004.
2. Assembly Rating: 2 hours.
3. Joint Width: One inch.
4. Movement Capabilities: Class II - 12½ percent compression or extension.

END OF SECTION 078443

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes sealants for the following applications, including those specified by reference to this Section:
- B. This Section includes sealants for the following applications:
1. Exterior joints in the following vertical surfaces and nontraffic horizontal surfaces:
 - a. Control and expansion joints in stucco.
 - b. Control and expansion joints in tilt-up concrete panels.
 - c. Joints between different materials listed above.
 - d. Perimeter joints between materials listed above and frames of doors and windows.
 - e. Other joints as indicated.
 2. Interior joints in the following vertical surfaces and horizontal nontraffic surfaces:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Vertical control joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - d. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - e. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - f. Other joints as indicated.
- C. Related Sections include the following:
1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
 2. Division 07 Section "Penetration Firestopping" for through-penetration fire-resistant joint-sealant systems.
 3. Division 07 Section "Joint Firestopping" for top of wall fire-resistant building joint-sealant systems.
 4. Division 08 Section "Glazing" for glazing sealants.
 5. Division 09 Section "Gypsum Board" for sealing perimeter joints of gypsum board partitions to reduce sound transmission.
 6. Division 09 Section "Tiling" for sealing tile joints.

7. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters of acoustical ceilings.

1.3 PERFORMANCE REQUIREMENTS:

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.

1.4 SUBMITTALS:

- A. Product Data: For each joint-sealant product indicated.
- 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: For each type and color of joint sealant required. Install joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Product Certificates: Signed by manufacturers of joint sealants certifying that products furnished comply with requirements and are suitable for the use indicated.
- E. SWRI Validation Certificate: For each elastomeric sealant specified to be validated by SWRI's Sealant Validation Program.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Preconstruction Field Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on preconstruction testing specified in "Quality Assurance" Article.
- H. Field Test Report Log: For each elastomeric sealant application. Include information specified in "Field Quality Control" Article.
- I. 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. Product Test Reports: From a qualified testing agency indicating sealants comply with requirements, based on comprehensive testing of current product formulations.
- K. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE:

- A. **Installer Qualifications:** An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. **Source Limitations:** Obtain each type of joint sealant through one source from a single manufacturer.
- C. **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 manufacturers standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - a. Perform tests under environmental conditions replicating those that will exist during installation.
 - 2. Submit not fewer than nine pieces of each type 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 the 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 of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
- D. **Product Testing:** Obtain test results for "Product Test Reports" Paragraph in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. **Testing Agency Qualifications:** An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
 - 3. Test elastomeric joint sealants 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.
 - 4. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- E. **Preconstruction Field-Adhesion Testing:** Before installing elastomeric sealants, field test their adhesion to joint substrates as follows:
 - 1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.

- b. Each type of nonelastomeric sealant and joint substrate indicated.
- 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
- 4. Test Method: Test joint sealants by hand-pull method described below:
 - a. Install joint sealants in 60-inch- long joints using same materials and methods for joint preparation and joint-sealant installation required for the completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.
 - c. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - d. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
- 5. Report whether sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type 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.
- F. Mockups: Before installing joint sealants, apply elastomeric sealants as follows to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution:
 - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.6 DELIVERY, STORAGE, AND HANDLING:

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

1.7 PROJECT CONDITIONS:

- A. Environmental Limitations: 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 ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 deg F.
 - 3. When joint substrates are wet.
- B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.8 WARRANTY:

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Special Installer's Warranty: Written warranty, signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- C. Special Manufacturer's Warranty: Written warranty, signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: 20 years from date of Substantial Completion.
- D. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
 - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
 - 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 PRODUCTS AND MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each type in the sealant schedules at the end of Part 3.

2.2 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 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: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- 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 for this characteristic.

2.3 ELASTOMERIC JOINT SEALANTS:

- A. Elastomeric Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant in the Elastomeric Joint-Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
- B. Additional Movement Capability: Where additional movement capability is specified in the Elastomeric Joint-Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at the time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

2.4 JOINT-SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

- B. Cylindrical Sealant Backings: ASTM C 1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 - 1. Type C: Closed-cell material with a surface skin.
- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and otherwise contribute to optimum sealant performance.
- D. 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 where such adhesion would result in sealant failure. 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 with joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- 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, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended in writing by joint sealant manufacturer, based on 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 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 of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

- C. Install sealant backings of type 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 back of joints.
- E. Install sealants by proven techniques to 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 provided for 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 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 sealants from surfaces adjacent to joint.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

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 elastomeric sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each type of elastomeric sealant and joint substrate.
 - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
 - 2. Test Method: Test joint sealants by hand-pull method described below:
 - a. Make knife cuts from one side of joint to the other, followed by two cuts approximately 2 inches long at sides of joint and meeting cross cut at one end. Place a mark 1 inch from cross-cut end of 2-inch piece.

- b. Use fingers to grasp 2-inch piece of sealant between cross-cut end and 1-inch mark; pull firmly at a 90-degree angle or more in direction of side cuts while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - c. For joints with dissimilar substrates, check adhesion to each substrate separately. Do this by extending cut along one side, checking adhesion to opposite side, and then repeating this procedure for opposite side.
3. Inspect joints for complete fill, for absence of voids, and for joint configuration complying with specified requirements. Record results in a field adhesion test log.
 4. Inspect tested joints and report on the following:
 - a. 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 type of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field- adhesion hand-pull test criteria.
 - b. Whether sealants filled joint cavities and are free from voids.
 - c. Whether sealant dimensions and configurations comply with specified requirements.
 5. 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.
 6. Repair sealants pulled from test area by applying new sealants following same procedures used to originally seal joints. Ensure that original sealant surfaces are clean and new sealant contacts original sealant.
- B. Evaluation of Field-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 sealants 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 the original work.

3.7 ELASTOMERIC JOINT-SEALANT SCHEDULE:

- 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. Dow Corning Corporation; 790.
 - b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
 - c. Pecora Corporation; 890FTS.
 - d. Sika Corporation, Construction Products Division; SikaSil-C990.
 - e. Tremco Incorporated; Spectrem 1.
 - 2. Color: Custom colors, match architects samples. A different color will be required for each exterior material (brick, CMU, aluminum door frames, aluminum window frames, hollow metal door frames, precast concrete).
 - 3. Movement Capability: **100** percent movement in extension and **50** percent movement in compression.
 - 4. Use Related to Exposure: NT (nontraffic).
 - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Painted aluminum, galvanized steel, and concrete.
 - 6. Stain-Test-Response Characteristics: Nonstaining to porous substrates per ASTM C 1248.
 - 7. Applications: **Exterior**, horizontal and vertical joints:
 - a. Perimeter joints of aluminum and steel frames in exterior walls.
 - b. Control joints in exterior insulation and finish systems.
 - c. Control joints in concrete masonry.
 - d. Other joints as indicated on Drawings.
- B. Single-Component Nonsag Urethane Sealant: Where joint sealants of this type are indicated, provide products complying with the following:
 - 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. Chem-Calk 900; Bostik Inc.
 - b. Vulkem 116; Tremco.
 - c. Dynatrol I; Pecora Corporation.
 - d. DyMonic; Tremco.
 - 2. Color: As selected by Architect from manufacturer's standards. A different color will be required for each interior material (brick, CMU, aluminum door frames, aluminum window frames, hollow metal door frames).
 - 3. Type and Grade: S (single component) and NS (nonsag).
 - 4. Class: **25**.

5. Use Related to Exposure: NT (nontraffic).
 6. Uses Related to Joint Substrates: M, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Painted aluminum, galvanized steel, concrete masonry.
 7. Applications: **Interior**, horizontal and vertical joints:
 - a. Perimeter joints of aluminum and steel frames in exterior walls.
 - b. Control joints in concrete masonry.
 - c. Other joints as indicated on Drawings.
- C. Mildew-Resistant Silicone Sealant: Where joint sealants of this type are indicated, provide products formulated with fungicide that are intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and temperature extremes, and that comply with the following:
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. 786 Mildew Resistant; Dow Corning.
 - b. Sanitary 1700; GE Silicones.
 - c. 898 Silicone Sanitary Sealant; Pecora Corporation.
 - d. PSI-611; Polymeric Systems, Inc.
 - e. Tremsil 600 White; Tremco.
 2. Color: As selected by Architect from manufacturer's standards. A different color will be required for each type and color plumbing fixture.
 3. Type and Grade: S (single component) and NS (nonsag).
 4. Class: 25.
 5. Use Related to Exposure: NT (nontraffic).
 6. Uses Related to Joint Substrates: G, A, and, as applicable to joint substrates indicated, O.
 - a. Use O Joint Substrates: Glass, ceramic tile.
 7. Applications: **Interior**, horizontal and vertical joints: Perimeter joints of plumbing fixtures and adjoining walls, floors, and counters. Tile control and expansion joints where indicated.
 - a. Other joints as indicated on Drawings.
- D. Latex Sealant: Comply with ASTM C 834, Type P, Grade NF.
1. For joints in vertical **interior** surfaces which are painted, but not limited to:
 - a. Interior trim or finish joints subject to movement.
 - b. Perimeter joints of metal door frames on interior walls.
 - c. Control joints in gypsum board partitions.
 - d. Joints where acoustical sealant is indicated.
 - e. Other joints as indicated on Drawings.

2. Available Products:

- a. Bostik Findley; Chem-Calk 600.
- b. Pecora Corporation; AC-20+.
- c. Schnee-Morehead, Inc.; SM 8200.
- d. Sonneborn, Division of ChemRex Inc.; Sonolac.
- e. Tremco; Tremflex 834.

END OF SECTION 079200

SECTION 079219

ACOUSTICAL 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 acoustical joint sealants.
- B. Related Requirements:
 - 1. Section 079200 "Joint Sealants" for elastomeric, latex, and butyl-rubber-based joint sealants for nonacoustical applications.

1.3 ACTION SUBMITTALS:

- A. Product Data: For each acoustical joint sealant.
- 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: For each kind and color of acoustical joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Acoustical-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS:

- A. Product Test Reports: For each kind of acoustical joint sealant, for tests performed by a qualified testing agency.
- B. Sample Warranties: For special warranties.

1.5 WARRANTY:

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.
- B. VOC Content of Interior Sealants: Sealants and sealant primers shall comply with the following:
 - 1. Acoustical sealants and sealant primers shall have a VOC content of 250 g/L or less.
- C. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS:

- A. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
 - 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. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
 - b. GE Construction Sealants; RCS20 Acoustical.
 - c. Grabber Construction Products; Acoustical Sealant GSC.
 - d. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - e. Owens Corning; QuietZone Acoustic Sealant.
 - f. Pecora Corporation; AC-20 FTR.
 - g. Serious Energy Inc.; Quiet Seal Pro.
 - h. Tremco, Incorporated; Tremco Acoustical Sealant.

- i. USG Corporation; SHEETROCK Acoustical Sealant.
2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Acoustical Sealant for Concealed Joints: Manufacturer's standard nonsag, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber acoustical sealant.
 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. Pecora Corporation; BA-98.
 - b. Serious Energy Inc.; Quiet Seal 350.
 - c. OSI; SC-170.

2.3 JOINT-SEALANT BACKING:

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems.
 - b. Construction Foam Products, a division of Nomaco, Inc.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell 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.

2.4 MISCELLANEOUS MATERIALS:

- A. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- 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 acoustical joint sealants, with Installer present, for compliance with requirements for joint configuration, 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. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer. 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 ACOUSTICAL JOINT SEALANTS:

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

3.4 CLEANING:

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of acoustical joint sealants and of products in which joints occur.

3.5 PROTECTION:

- A. Protect acoustical 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, remove, and repair damaged or deteriorated acoustical joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 079219

SECTION 079513.13

INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes interior expansion joint cover assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
 - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples: For each expansion joint cover assembly and for each color and texture specified, full width by 6 inches (150 mm) long in size.
- D. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.
- E. Samples for Verification: For each type of expansion joint cover assembly, full width by 6 inches (150 mm) long in size.
- F. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion joint cover assembly.
 - 2. Expansion joint cover assembly location cross-referenced to Drawings.
 - 3. Nominal, minimum, and maximum joint width.
 - 4. Movement direction.
 - 5. Materials, colors, and finishes.

- 6. Product options.
- 7. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of typical expansion joint cover assembly as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

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

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.
- C. Expansion Joint Design Criteria:
 - 1. Type of Movement: Thermal.
 - a. Nominal Joint Width: As indicated on Drawings.

2. Type of Movement: Seismic.
 - a. Joint Movement: As indicated on Drawings.

2.3 FLOOR EXPANSION JOINT COVERS

A. Hidden-Sightline Floor Joint Cover (**EJ-01**): Sliding leaf-spring and metal frame assembly designed to accept field-applied finish materials on visible surfaces for minimum frame exposure.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **#516-A01-100; Jointmaster - InPro Corporation**, or comparable product by one of the following:
 - a. Balco, Inc.
 - b. Construction Specialties, Inc.
 - c. InPro Corporation (IPC).
 - d. MM Systems Corporation.
 - e. Nystrom, Inc.
 - f. Watson Bowman Acme Corp.
2. Application: Floor to floor.
3. Installation: Recessed.
4. Load Capacity:
 - a. Uniform Load: 50 lb/sq. ft. (244 kg/sq. m).
 - b. Concentrated Load: 300 lb (136 kg).
 - c. Maximum Deflection: 0.0625 inch (1.6 mm).
5. Fire-Resistance Rating: Not less than that of adjacent construction.

B. Hidden-Sightline Floor Joint Cover (**EJ-03**): Sliding leaf-spring and metal frame assembly designed to accept field-applied finish materials on visible surfaces for minimum frame exposure.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **#516-A01-100; Jointmaster - InPro Corporation**, or comparable product by one of the following:
 - a. Balco, Inc.
 - b. Construction Specialties, Inc.
 - c. InPro Corporation (IPC).
 - d. MM Systems Corporation.
 - e. Nystrom, Inc.
 - f. Watson Bowman Acme Corp.
2. Application: Floor to wall.
3. Installation: Recessed.
4. Load Capacity:
 - a. Uniform Load: 50 lb/sq. ft. (244 kg/sq. m).

- b. Concentrated Load: 300 lb (136 kg).
 - c. Maximum Deflection: 0.0625 inch (1.6 mm).
5. Fire-Resistance Rating: Not less than that of adjacent construction.

2.4 WALL EXPANSION JOINT COVERS

- A. Center-Plate Wall Joint Cover (**EJ-02**): Assembly consisting of center plate that slides over gaskets in metal frames fixed to sides of joint gaps.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide **#253-A07-100; InPro Corporation**, or comparable product by one of the following:
 - a. Architectural Art Manufacturing Inc.; a division of Pittcon Architectural Metals, LLC.
 - b. Balco, Inc.
 - c. Construction Specialties, Inc.
 - d. MM Systems Corporation.
 - e. Nystrom, Inc.
 - f. Watson Bowman Acme Corp.
 - 2. Application: Wall to wall.
 - 3. Fire-Resistance Rating: Not less than that of adjacent construction.
 - 4. Exposed Metal:
 - a. Aluminum: Color anodic, Class I.
 - 1) Color: Black.

2.5 MATERIALS

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

2.6 ALUMINUM FINISHES

- A. Mill finish.

- B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches (75 mm) from each end and not more than 24 inches (600 mm) o.c.

- C. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- D. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- E. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
 - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- F. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.

3.4 PROTECTION

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

END OF SECTION 079513.13

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following
 - 1. Steel doors and frames.
 - 2. Tornado Impact steel doors and frames.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 04 Section "Unit Masonry" for building anchors into and grouting frames in masonry construction.
 - 2. Division 08 Section "Flush Wood Doors" for solid-core wood doors installed in steel frames.
 - 3. Division 08 Section "Aluminum-Framed Entrances and Storefronts" for aluminum doors.
 - 4. Division 08 Section "Door Hardware" for door hardware and weatherstripping.
 - 5. Division 08 Section "Glazing" for glass in steel doors and sidelights.
 - 6. Division 09 Section "Painting" for field painting primed doors and frames.

1.3 SUBMITTALS:

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product Data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.
- C. Shop Drawings showing fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.
- D. Door Schedule: Submit schedule of doors and frames using same reference numbers for details and openings as those on Contract Drawings.
 - 1. Indicate coordination of glazing frames and stops with glass and glazing requirements.

1.4 QUALITY ASSURANCE:

- A. Provide doors and frames complying with ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as specified.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10C.
 - 1. At doors tested in accordance with NFPA 252, after 5 minutes into the test, establish the neutral test pressure level in the furnace at 40 inches or less above the sill.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- C. Tornado Doors: Design Door and Frame Systems for Federal Emergency Management Agency (FEMA) community shelters and other areas of refuge to resist the design wind pressures and missile impact loads as detailed in Design and Construction Guidance for Community Safe Rooms - FEMA 361. Door and Frame Systems shall also be listed in compliance with ANSI / ICC 500 - Standard for the Design and Construction of Storm Shelters.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch- high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch spaces between stacked doors to promote air circulation.

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 Doors and Frames:
 - a. Baron Steel Doors & Frames; an Assa Abloy Group company.
 - b. Ceco Door Products; an Assa Abloy Group company.
 - c. Curries; an Assa Abloy Group company

- d. Republic Doors and Frames.
- e. Steelcraft; an Allegion company.
- f. de La Fontaine Inc.
- g. The Philipp Manufacturing Co.

2.2 MATERIALS:

- A. Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with ASTM A 569.
- B. Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A 620, drawing quality, special killed.
- C. Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526, commercial quality, or ASTM A 642, drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60 coating designation, mill phosphatized.
- D. Supports and Anchors: Fabricated from not less than 0.0478-inch- thick steel sheet; 0.0516-inch-thick galvanized steel where used with galvanized steel frames.
- E. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2.3 DOORS:

- A. Steel Doors: Provide 1-3/4-inch- thick doors of materials and ANSI/SDI 100 grades and models specified below, or as indicated on Drawings or schedules:
 - 1. Interior Doors: Grade II, heavy-duty, Model 1, full flush design, minimum 18-gage (0.0478-inch-thick) cold-rolled steel sheet faces.
 - 2. Exterior Doors: Grade III, extra heavy-duty, Model 2, seamless design, minimum 16-gage, (0.0598-inch-thick) galvanized steel sheet faces.
- B. Tornado Resistant Doors: Provide 1-3/4-inch thick doors meeting requirements of FEMA 361/320 guidelines and ANSI A250.8-2003 (SDI 100).
 - 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. Ambico.
 - b. Armortex.
 - c. Door Components.
 - d. DKS.
 - e. Pioneer.
 - f. Republic.
 - g. Rocky Mountain Metal.
 - h. Steelcraft.
 - i. Ceco.

2. General: Construct exterior/interior doors to the following designs and gages:
 - a. Include galvanized components and internal reinforcements.
 - b. Prime Finish Doors: Clean, phosphatize and factory prime painted doors indicated on Door Schedule as HM.
 - c. Hardware Reinforcements:
 - 1) Hinge reinforcements for full mortise hinges: minimum 7 gage (4.7 mm).
 - 2) Lock reinforcements: minimum 16 gage (1.3 mm).
 - 3) Closer reinforcements: minimum 14 gage (1.7 mm) steel, 20-inch (508 mm) long.
 - 4) Galvanized doors: include galvanized hardware reinforcements.
 - 5) Projection welded hinge and lock reinforcements to the edge of the door.
 - 6) Provided adequate reinforcements for other hardware as required.

3. Tornado Door Systems: Comply with Federal Emergency Management Agency (FEMA) 361 Guidelines and provides the highest level of security and safety for tornado shelters and severe storm areas of refuge.
 - a. Face sheets: 14 gage (1.7 mm) galvanized steel having an A60 zinc-iron alloy coating conforming to ASTM designations A653 and A924.
 - b. Hinge and lock edges:
 - 1) Continuous vertical mechanical joints with edge seams welded, filled and ground smooth.
 - 2) Bevel edges 1/8 inch (3 mm) in 2 inches (50 mm). Square edges are not acceptable.
 - c. Hinge reinforcements: Minimum 7 gage (4.2 mm) galvanized steel, projection welded to the edge of the door.
 - d. Top and bottom steel reinforcement channels, galvanized 14 gage (1.7 mm), projection welded to both face sheets on 4 inches (102 mm) centers.
 - e. Reinforce door faces with 18 gage (1.0 mm) vertical stiffeners manufactured from Galvanized steel conforming to ASTM A 653 and ASTM A 924 and welded to each face sheet.
 - f. Reinforced lock stiles with full-height 12 gage (2.3 mm) lock reinforcing channels.

C. Accessories:

1. Anchors: Manufacturer's standard framing anchors, specified in manufacturer's printed installation instructions for project conditions.
2. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings.
3. Door Bottom:
 - a. Acceptable Product: Steelcraft Fas-Seal Door Bottom.
 - b. Characteristics: Electrometric, continuous strip, screw-attached to recessed bottom door channel for concealed installation; double-sealing; acceptable for fire-rated doors up to 3 hour rating.

4. Plaster Guards: Same material as door frame, minimum 24 gage (0.5 mm) minimum; provide for all strike boxes.
5. Silencers: Resilient rubber, Inserted type, three per strike jamb for single openings and two per head for paired openings. Stick-on silencers shall not be permitted except on hollow metal framing systems.

2.4 FRAMES:

- A. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, according to ANSI/SDI 100, and of types and styles as shown on Drawings and schedules. Conceal fastenings, unless otherwise indicated.
 1. Fabricate frames with mitered or coped and continuously welded corners.
 2. Interior Frames Up to 48" wide: Form frames from 16-gage (0.0598-inch-thick) cold-rolled steel sheet.
 3. Interior Frames Over 48" wide and Exterior Frames: Form from 14-gage (0.0785-inch-thick) galvanized steel sheet.
 4. Exterior frames shall be thermally broken.
 - a. Thermal Performance: U-factor of 0.38 deg Btu/F x h x sq. ft. (2.16 W/K x sq. m).
 - b. Manufacturers:
 - 1) Steelcraft; FT Series.
 - 2) Ceco Door; Thermal Break Hollow Metal Door Frame.
 - 3) Curries; Thermal Break Hollow Metal Door Frame.
 - 4) Pioneer; Thermal Break Series.
- B. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.
- C. Plaster Guards: Provide minimum 0.0179-inch-thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.
- D. Grout: When required in masonry construction, as specified in Division 4 Section "Unit Masonry."

2.5 FABRICATION:

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
 1. Internal Construction: One of the following manufacturer's standard core materials according to SDI standards:
 - a. Exterior Door Cores: Rigid polyurethane conforming to ASTM C 591.
 - b. Fire Door Cores: As required to provide fire-protection and temperature-rise ratings indicated.

- c. Interior Door Cores: Kraft-paper honeycomb.
- 2. Clearances: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between non-fire-rated pairs of doors. Not more than 3/4 inch at bottom.
 - a. Fire Doors: Provide clearances according to NFPA 80.
- B. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.
- C. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- E. Galvanized Steel Doors, Panels, and Frames: For the following locations, fabricate doors, panels, and frames from galvanized steel sheet according to SDI 112. Close top and bottom edges of doors flush as an integral part of door construction or by addition of minimum 0.0635-inch- thick galvanized steel channels, with channel webs placed even with top and bottom edges. Seal joints in top edges of doors against water penetration.
 - 1. At exterior locations.
- F. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- G. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.
 - 1. Unless otherwise indicated, provide thermal-rated assemblies with U-value rating of 0.41 Btu/sq. ft. x h x deg F or better.
- H. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.
- I. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- J. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
- K. Glazing Stops: Minimum 0.0359-inch- thick steel or 0.040-inch- thick aluminum.
 - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.

2. Provide screw-applied, removable, glazing beads on inside of glass, louvers, and other panels in doors.

2.6 FINISHES, GENERAL:

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.
- B. Comply with SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.
- C. Apply primers and organic finishes to doors and frames after fabrication.

2.7 GALVANIZED STEEL SHEET FINISHES:

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so that surfaces are free of oil or other contaminants. After cleaning, apply a conversion coating of the type suited to the organic coating applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
 1. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035 or SSPC-Paint 20.
- B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.
 1. Shop Primer: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

2.8 STEEL SHEET FINISHES:

- A. Surface Preparation: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).
- B. Pretreatment: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.
- C. Factory Priming for Field-Painted Finish: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

- B. Placing Frames: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Place frames before constructing enclosing walls and ceilings.
 - 2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - 4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.
 - 5. Install fire-rated frames according to NFPA 80.

- C. Door Installation: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.
 - 1. Fire-Rated Doors: Install with clearances specified in NFPA 80.
 - 2. Smoke-Control Doors: Comply with NFPA 105.

- D. Tornado Resistant Door Installation:
 - 1. Install doors and frames in accordance with manufacturer's printed installation instructions and with Steel Door Institute's recommended erection instructions for steel frames ANSI A250.11 and NAAMM/HMMA 840.
 - 2. Provide full height 3/8 inch (9.5 mm) to 1-1/2 inch (38 mm) thick strip of polystyrene foam blocking at frames requiring grouting where continuous hinges are specified. Apply the strip to the back of the frame, where the hinge is to be installed, to facilitate field drilling or tapping.

3.2 ADJUSTING AND CLEANING:

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

END OF SECTION 081113

SECTION 081416

FLUSH WOOD DOORS

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
1. Solid-core doors with plastic-laminate faces.
 2. Factory finishing flush wood doors.
 3. Factory machining for hardware.
- B. Related Sections include the following:
1. Division 08 Section "Door Hardware" for hardware and sound seal requirements.
 2. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.3 SUBMITTALS:

- A. Product Data: For each type of door. Include details of core and edge construction, trim for openings, and louvers.
1. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
1. Indicate dimensions and locations of mortises and holes for hardware.
 2. Indicate dimensions and locations of cutouts.
 3. Indicate requirements for veneer matching.
 4. Indicate doors to be factory finished and finish requirements.
 5. Indicate fire ratings for fire doors.
- C. Product Test Reports: From a qualified testing agency indicating and interpreting test results for sound ratings and compliance of fire ratings with requirements indicated.
- D. Samples for Initial Selection: Color charts consisting of actual materials in small sections for the following:
1. Faces of factory-finished doors with transparent finish. Show the full range of colors available for stained finishes.

E. Samples for Verification: As follows:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - b. Provide Samples for each color, texture, and pattern of plastic laminate required.
 - c. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
3. Louver blade and frame sections, 6 inches long, for each material and finish specified.
4. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 QUALITY ASSURANCE:

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A-04, Industry Standard for "Architectural Wood Flush Doors."
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 or UL 10C.
 1. At doors tested in accordance with NFPA 252, after 5 minutes into the test, establish the neutral test pressure level in the furnace at 40 inches or less above the sill.
 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F(250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's written instructions.
 1. Individually package doors in plastic bags or cardboard cartons.
- B. Mark each door with individual opening numbers used on Shop Drawings. Use removable tags or concealed markings.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with requirements of the referenced quality standard for Project's geographical location.

1.7 WARRANTY:

- A. General Warranty: Door manufacturer's warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form, signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span, or do not comply with tolerances in referenced quality standard.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time after the date of Substantial Completion:
 - a. Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide products manufactured by **Marshfield Door Systems**, or a comparable product by one of the following:
 - a. Algoma Hardwoods Inc.
 - b. Eggers Industries; Architectural Door Division.
 - c. VT Industries Inc.
 - d. Oshkosh Door Company.
 - e. Graham Wood Doors.

2.2 DOOR CONSTRUCTION, GENERAL:

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

- B. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - 2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

2.3 PLASTIC-LAMINATE-FACED DOORS:

- A. Interior Solid-Core Doors:
 - 1. Available Product: Marquis Series; Marshfield Doors Systems
 - 2. Grade: Premium.
 - 3. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
 - 4. Colors, Patterns, and Finishes: As indicated.
 - 5. Exposed Horizontal Edges: 7/8" structural composite lumber.
 - 6. Exposed Vertical Edges: 1" structural composite lumber with plastic laminate that matches faces, applied before faces.
 - 7. Core: Particleboard.
 - 8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.
 - 9. WDMA I.S.1-A Performance Grade: Heavy Duty.
 - 10. Blocking: Provide wood blocking at particleboard-core doors as follows:
 - a. 5-inch top-rail blocking.
 - b. 5-inch bottom-rail blocking.
 - c. 5-by-10-inch inner blocking for all surface mounted hardware.
 - d. 5-inch midrail blocking, in doors indicated to have exit devices.

2.4 FABRICATION:

- A. Fabricate flush wood doors in sizes indicated for Project site fitting.
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
 - 1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-rated doors.

- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 8 Section "Glazing."
- E. Sound Seals: Machine door for manufacturer's gasketing system to provide sound rating indicated.
 - 1. Reference Section "Door Hardware" for gasketing, door bottoms, and aluminum sills.

2.5 FACTORY FINISHING:

- A. General: Comply with referenced quality standard's requirements for factory finishing.
- B. Finish wood doors at factory.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine installed door frames before hanging doors.
 - 1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Manufacturer's Written Instructions: Install wood doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

- D. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at Project site.

3.3 ADJUSTING AND PROTECTING:

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 081416

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Interior stile and rail MDF wood doors with painted faux finish to simulate antique door.
 - 2. Factory fitting stile and rail wood doors to frames and factory machining for hardware.

1.3 SUBMITTALS:

- A. Product Data: For each type of door. Include details of construction and glazing.
 - 1. Include factory-finishing specifications.
 - 2. Include adhesive manufacturer's product data indicating urea-formaldehyde content.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate requirements for veneer matching.
 - 3. Indicate doors to be factory finished and finish requirements.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification: Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish sample with same materials proposed for factory-finished doors.
- E. Product Certificates: Signed by door manufacturers.
- F. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE:

- A. Source Limitations: Obtain stile and rail wood doors through one source from a single manufacturer.
- B. Quality Standard for Doors of Special Design and Construction: Comply with AWI's "Architectural Woodwork Quality Standards" unless more stringent requirements are specified.
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
- C. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 or UL 10C.
 - 1. At doors tested in accordance with NFPA 252, after 5 minutes into the test, establish the neutral test pressure level in the furnace at 40 inches or less above the sill.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in opaque plastic bags or cardboard cartons.
- C. Mark each door on top and bottom edge with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS:

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

1.7 WARRANTY:

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, and have warped (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Doors: Five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 3. Basis-of-Design Product: The design for each stile and rail door is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.2 MATERIALS:

- A. General: Use only materials that comply with referenced quality standards unless more stringent requirements are specified.
 - 1. Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and ASTM D 5751 for joints other than finger joints.
- B. Low-Emitting Materials:
 - 1. Provide doors made with adhesives and composite wood products that do not contain added urea-formaldehyde resins.
- C. Panel Products: Any of the following unless otherwise indicated:
 - 1. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde, complying with ANSI A208.2, Grade 130.
- D. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

2.3 STILE AND RAIL DOORS WITH OPAQUE FINISH :

- A. Interior Stile and Rail Wood Doors with Opaque Finish: Custom interior doors complying with AWI's "Architectural Woodwork Quality Standards," and WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," and with other requirements specified.
 - 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. **“Evcore Doors;” The Millenium Collection; DoorAmerica.**
 - 2. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
 - 3. Finish: Factory painted.
 - 4. Door Construction for 1-3/4" Flat Panel Doors: 7/8" Premium grade primed MDF (Medium Density Fiberboard) skins which are sandwiched 11/16" MDF board panels. Provide 1" Fir Stiles on each vertical edge precision routed into and sandwiched between the MDF skins. Stiles and rails assembled dowel construction.
 - 5. Adhesive: Use Type 1 glue in the internal construction of the door.
- B. Door Design (comply to detailed elevations on drawings).
 - 1. See Drawing A-580.

2.4 FABRICATION:

- A. Fabricate stile and rail wood doors in sizes indicated for Project-site fitting.
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
 - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/2 inch (13 mm) from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 3/8 inch (10 mm) from bottom of door to top of threshold.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.
 - 1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FACTORY FINISHING:

- A. General: Comply with referenced quality standard's requirements for factory finishing. Finish faces and edges of doors, including mortises and cutouts.
- B. Finish wood doors at factory.
- C. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Opaque Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish .
 - 3. Color: Custom color. Match Architect's sample.
 - a. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine doors and substrates, with Installer present, for suitable conditions where wood stile and rail doors will be installed.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Hardware: For installation, see Division 8 Section "Door Hardware."
- B. Install wood doors to comply with manufacturer's written instructions and with referenced quality standard, and as indicated.

- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING AND PROTECTING:

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081433

SECTION 083113.53

SECURITY ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes security access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details materials, individual components and profiles, and finishes.
- B. Samples: For each type of security access door and frame and for each finish specified, complete assembly minimum 6 by 6 inches (150 by 150 mm) in size.
- C. Product Schedule: For security access doors and frames. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 SECURITY ACCESS DOORS AND FRAMES

- A. Medium-Security Flush Access Doors (**AD-1**):
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **MT Series, Nystrom, Inc.**, or a comparable product by one of the following:
 - a. Babcock-Davis.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Karp Associates, Inc.
 - d. Williams Bros. Corporation of America (The).
 - 2. Locations: Wall.
 - 3. Door Size: 6 inches by 6 inches.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.897 inch, 12 gage cold rolled steel.
 - 5. Frame: Minimum 12 gauge cold rolled steel.
 - 6. Hinges: Heavy-duty steel welded to door and frame.

7. Latch and Lock: Prepared for mortise cylinder.
8. Finish: White baked on powder coat.

B. High-Security Flush Access Doors (**AD-2**):

1. Basis-of-Design Product: Subject to compliance with requirements, provide **TSS Series, Nystrom, Inc.**, or a comparable product by one of the following:
 - a. Babcock-Davis.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Karp Associates, Inc.
 - d. Williams Bros. Corporation of America (The).
2. Locations: Wall.
3. Door Size: 30 inches b y 30 inches.
4. Uncoated Steel Sheet for Door: Nominal 0.180 inch (4.55 mm), 7 gage; factory primed.
5. Frame: Minimum 3/16-by-2-by-2-by-3-inch (4.7-by-50-by-50-by-76-mm) angle welded with joints ground smooth.
6. Hinges: Heavy-duty steel welded to door and frame.
7. Latch and Lock: Prepared for mortise cylinder.
8. Finish: White baked on powder coat.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same type as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.

D. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Factory Powder Coated Finish: Apply manufacturer's standard lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
 1. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 083113.53

PART 1 - GENERAL1.1 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. Counter doors.
- B. Related Requirements:
1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
 3. Include description of automatic closing device and testing and resetting instructions.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
1. Include plans, elevations, sections, and mounting details.
 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 4. Show locations of locking devices and other accessories.
 5. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
1. Include similar Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
1. Curtain slats.
 2. Bottom bar.
 3. Guides.

4. Brackets.
5. Hood.
6. Locking device(s).

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.
 1. Obtain operators and controls from coiling counter door manufacturer.

2.2 COUNTER DOOR ASSEMBLY

- A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide **500 Series Rolling Counter Shutter; Wayne-Dalton Corp.** or comparable product by one of the following:
 - a. ACME Rolling Doors.
 - b. Alpine Overhead Doors, Inc.
 - c. Alumatec Pacific Products.
 - d. Amarr Garage Doors.
 - e. C.H.I. Overhead Doors.
 - f. City-Gates.
 - g. Clopay Building Products.
 - h. Cookson Company.
 - i. Cornell Iron Works, Inc.
 - j. Lawrence Roll-Up Doors, Inc.
 - k. McKeon Rolling Steel Door Company, Inc.
 - l. Metro Door.
 - m. Overhead Door Corporation.
 - n. QMI Security Solutions.
 - o. Raynor.

- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Door Curtain Material: Galvanized steel.
- D. Door Curtain Slats: Flat profile slats of 1-1/2-inch (38-mm) center-to-center height.
 - 1. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
 - 2. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated hot-dip galvanized steel and finished to match door.
- E. Curtain Jamb Guides: Galvanized steel with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- F. Hood: Match curtain material and finish.
 - 1. Shape: Square.
 - 2. Mounting: As shown on Drawings.
- G. Sill Configuration: No sill.
- H. Locking Devices: Equip door with locking device assembly.
 - 1. Locking Device Assembly: Cremone type, both jamb sides locking bars, operable from inside with thumb turn.
 - 2. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- I. Electric Door Operator:
 - 1. Usage Classification: Light duty, up to 10 cycles per hour.
 - 2. Operator Location: Tube motor operator.
 - 3. Motor Exposure: Interior.
 - 4. Emergency Manual Operation
 - 5. Obstruction Detection Device: Automatic electric sensor edge on bottom bar.
 - a. Sensor Edge Bulb Color: Black.
 - 6. Control Station: Interior-side.
- J. Curtain Accessories: Equip door with push/pull handles.
- K. Door Finish:
 - 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
 - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate coiling counter-door curtain of interlocking metal slats in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm); and as required.
- B. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain.

2.4 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - a. Hood Finish: Baked-Enamel or Powder-Coat Finish to match door.

2.5 CURTAIN ACCESSORIES

- A. Smoke Seals: Equip each fire-rated door with replaceable smoke-seal perimeter gaskets or brushes for smoke and draft control as required for door listing and labeling by a qualified testing agency.
- B. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.

2.6 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
- C. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 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. Wayne Dalton; Tube Motor.
 - 2. Comply with NFPA 70.
 - 3. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Tube motor.
- D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated.
 - 1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 115 V.
 - c. Hertz: 60.
 - 2. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
 - 3. Operating Controls, Controllers, Disconnect Switches, Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - 4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
 - 1. Electric Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.

- G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."
 - 1. Type: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- I. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES

- A. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrate areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install coiling counter doors, hoods, controls, and operators at the mounting locations indicated for each door.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

- C. Adjust seals to provide tight fit around entire perimeter.

3.4 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance, including emergency callback service, during normal working hours.
 - 2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 083313

SECTION 083323

OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Insulated service door.
- B. Related Sections:
 - 1. Division 05 Section "Metal Fabrications" for miscellaneous steel supports.
 - 2. Division 26 Sections for electrical service and connections for powered operators and accessories.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 - 1. Design Wind Load: See Structural Drawings.
 - a. Uniform pressure (velocity pressure) of 20 lbf/sq. ft.960 Pa, acting inward and outward.
 - 2. Testing: According to ASTM E 330.
 - 3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
 - 4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20 lbf/sq. ft.960 Pa wind load, acting inward and outward.
- C. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: 1.25.
- D. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

1.4 SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory. Include the following:
 - 1. Construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
 - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Show locations of replaceable fusible links, if any.
 - 3. Wiring Diagrams: For power, signal, and control wiring.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.
- D. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Detail fabrication and assembly of seismic restraints.
 - 2. Summary of forces and loads on walls and jambs.
- E. Qualification Data: For qualified Installer.
- F. Seismic Qualification Certificates: For overhead coiling doors, accessories, and components, from manufacturer.
- G. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead coiling door manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

PART 2 - PRODUCTS

2.1 DOOR CURTAIN MATERIALS AND CONSTRUCTION

- A. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:
 - 1. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with G90 (Z275) zinc coating; nominal sheet thickness (coated) of 0.028 inch (0.71 mm) and as required to meet requirements.
 - 2. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
 - 3. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
 - 4. Gasket Seal: Provide insulated slats with manufacturer's standard interior-to-exterior thermal break or with continuous gaskets between slats.
- B. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
- C. Bottom Bar for Service Doors: Consisting of two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm) thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
- D. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- E. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.

2.2 HOOD

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
- B. Interior Mounted Hoods:
 - 1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized steel sheet with minimum G60 zinc coating, complying with ASTM A 653/A 653M.

2.3 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.4 CURTAIN ACCESSORIES

- A. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
 - 1. At door head, use 1/8-inch- (3-mm-) thick, replaceable, continuous sheet secured to inside of hood.
 - 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch- (3-mm-) thick seals of flexible vinyl, rubber, or neoprene.

2.5 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.
- C. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- D. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.6 ELECTRIC DOOR OPERATORS

- A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - 1. Comply with NFPA 70.
 - 2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
- C. Door Operator Location(s): Operator location indicated for each door.
 - 1. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
- D. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements for Equipment" unless otherwise indicated.
 - 1. Electrical Characteristics:
 - a. Phase: Single phase.
 - b. Volts: 120 V.
 - c. Hertz: 60.

2. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 3. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
 4. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 5. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
- E. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
- F. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel.
1. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - a. Self-Monitoring Type: Four-wire configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
- G. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
1. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 2. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
- H. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 25 lbf (111 N).
- I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
- J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.

2.7 INSULATED SERVICE DOOR:

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Stormtite Model 627, F-265I; Overhead Door Corporation**, or comparable product by one of the following:
 - a. Cookson Company.
 - b. Cornell Iron Works, Inc.
 - c. McKeon Rolling Steel Door Company, Inc.
 - d. Overhead Door Corporation.
 - e. Raynor.
 - f. Wayne-Dalton Corp.
- B. Operation Cycles: Not less than 20,000.
 - 1. Include tamperproof cycle counter.
- C. Curtain R-Value: 10.9, U-Value: 0.09.
- D. Door Thickness: 1-1/2".
- E. Door Curtain Slats: Flat profile slats of 2-5/8-inch (67-mm) center-to-center height.
 - 1. Insulated-Slat Interior Facing: Galvanized Steel.
- F. Curtain Jamb Guides: Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- G. Hood:
 - 1. Shape: Square.
 - 2. Mounting: Face of wall.
- H. Locking Devices: Equip door with slide bolt for padlock.
- I. Door and Hood Finish:
 - 1. Factory prime-finished galvanized steel.
- J. Electric Door Operator:
 - 1. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 - 2. Operator Location: Wall.
 - 3. Safety: Listed according to UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 feet 2.44 m or lower.
 - 4. Motor Exposure: Interior.
 - 5. Emergency Manual Operation: Chain type.
 - 6. Obstruction-Detection Device: Automatic photoelectric sensor.
 - 7. Control Station(s): Interior mounted.
- K. Door and Hood Finish:
 - 1. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide weathertight fit around entire perimeter.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 083323

SECTION 084113

ALUMINUM 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 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Exterior entrance systems (thermally broken).
 - 2. Interior entrance systems.
 - 3. Exterior storefront systems (thermally broken).
 - 4. Interior storefront systems.
- B. Related sections include the following:
 - 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of aluminum entrance and storefront systems.
 - 2. Division 8 Section "Glazing."
- C. Products installed but not supplied under this Section:
 - 1. Installation of door hardware for aluminum entrances and storefronts. Door Hardware is specified under Division 08 Section "Door Hardware."

1.3 SYSTEM DESCRIPTION:

- A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:
 - 1. Air infiltration and water penetration exceeding specified limits.
 - 2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
- B. Glazing: Physically and thermally isolate glazing from framing members.
- C. Thermally Broken Construction: Provide systems that isolate aluminum exposed to exterior from aluminum exposed to interior with a material of low thermal conductance.
- D. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction or the American Society of Civil Engineers' ASCE 7, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.
 - 1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller, unless otherwise indicated.
 - 2. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.
 - a. Test Pressure: 150 percent of inward and outward wind-load design pressures.

- b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.
- E. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.
 - 1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.
 - 2. Provide a minimum 1/16-inch clearance between members and operable windows and doors.
- F. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.
- G. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 1.57 lbf/sq. ft..
- H. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft.. Water leakage is defined as follows:
 - 1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
- I. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- J. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway and deflection.
- K. Condensation Resistance: Provide storefront systems with condensation resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.1.
- L. Average Thermal Conductance: Provide storefront systems with average U-values of not more than 0.63 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.1.
- M. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS:

- A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- B. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
- D. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- E. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Expansion provisions.
 - 4. Glazing.
 - 5. Flashing and drainage.
- F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- G. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- H. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

1.5 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.
 - 1. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Testing Agency Qualifications: Demonstrate to Architect's satisfaction, based on Architect's evaluation of criteria conforming to ASTM E 699, that the independent testing agency has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Source Limitations: Obtain each type of entrance and storefront system, aluminum window system and glazed aluminum curtain wall system through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."
 - 1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

- F. Mockups: Before installing entrance and storefront systems, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before proceeding with installation of systems.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. When directed, demolish and remove mockups from Project site.
 - b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating systems without field measurements. Coordinate construction to ensure actual dimensions correspond to established dimensions.

1.7 WARRANTY:

- A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.
- B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of entrance and storefront systems that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:
1. Structural failures including, but not limited to, excessive deflection.
 2. Failure of system to meet performance requirements.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Failure of operating components to function normally.
 5. Water leakage through fixed glazing and frame areas.
- C. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Storefront Entry System:
1. Basis-of-Design Product: Subject to compliance with requirements, provide Series "500" wide stile door, "**TRIFAB VG - 451T**" center glazed, thermal storefront, "**TRIFAB VG - 451**" non-thermal storefront, Kawneer Company, Inc., or a comparable product by one of the following:

- a. Series "**D-500**" wide stile door, "**403T**" center set, thermal storefront, "**402**" non-thermal storefront, EFCO Corporation.
- b. Series "**WS-500**" wide stile door, "**3000T**" center set, thermal storefront, "**3000**" center set, non-thermal storefront, Oldcastle Building Envelope.
- c. Series "**ProTek**" 50HL wide stile door, "**YES 45 XT**" thermal storefront, "**Yes 45 FI**" non-thermal storefront; YKK AP.

2.2 MATERIALS:

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Bars, Rods, and Wire: ASTM B 211.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10.
- B. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.
- C. Glazing as specified in Division 8 Section "Glazing."
- D. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.
- E. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.
- F. Framing system gaskets, sealants, and joint fillers as recommended by manufacturer for joint type.
- G. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."
- H. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 COMPONENTS:

- A. Stile Doors: Provide manufacturer's standard 1-3/4 -inch- thick glazed doors with minimum 0.188-inch- thick, extruded tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deep penetration and fillet welded or that incorporate concealed tie-rods.
 - 1. Glazing Stops and Gaskets: Provide manufacturer's standard snap-on extruded-aluminum glazing stops and preformed gaskets.
 - 2. Stile Design: Wide stile; over 4 inches wide.
 - 3. Bottom Rail: Custom, 6-1/2-inches high.
- B. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components.

- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Reinforce members as required to retain fastener threads.
 - 2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.
- D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.
- E. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, complying with ASTM A 666, of type selected by manufacturer for compatibility with system.
- F. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:
 - 1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.
 - 2. Sliding Weather Stripping: Wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing complying with AAMA 701 requirements.

2.4 HARDWARE:

- A. General: Provide weather stripping indicated in sizes, number, and type recommended by manufacturer for entrances indicated. Finish exposed parts to match door finish, unless otherwise indicated.
- B. Cylinders and Balance of Hardware: As specified in Division 8 Section "Door Hardware."

2.5 FABRICATION:

- A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - 1. Fabricate components for screw-spline frame construction.
- B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
- C. Prepare components to receive concealed fasteners and anchor and connection devices.
- D. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- E. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. 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.
- F. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."
- G. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- H. Storefront: Fabricate framing in profiles indicated for flush glazing (without projecting stops). Provide subframes and reinforcing of types indicated or, if not indicated, as required for a complete system. Factory assemble components to greatest extent possible. Disassemble components only as necessary for shipment and installation.
- I. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door and frame units and factory install hardware to greatest extent possible. Reinforce door and frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.
 - 1. Exterior Doors: Provide compression weather stripping at fixed stops. At other locations, provide sliding weather stripping retained in adjustable strip mortised into door edge.
 - 2. Interior Doors: Provide ANSI/BHMA A156.16 silencers at stops to prevent metal to metal contact. Provide 3 silencers on strike jamb of single-door frames and 2 silencers on head of double-door frames.

2.6 ALUMINUM FINISHES:

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.
- D. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- E. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1. Color: Dark bronze.
 - 2. Locations: Doors 118B and 118C only.

2.7 STEEL PRIMING:

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.
- B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel.
- C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

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 entrance and storefront systems. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. General: Comply with manufacturer's written instructions for protecting, handling, and installing entrance and storefront systems. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
- B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.
- D. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Division 7 Section "Joint Sealants."
- E. Install framing components plumb and true in alignment with established lines and grades without warp or rack of framing members.
- F. Install entrances plumb and true in alignment with established lines and grades without warp or rack. Install door hardware as specified in Section 08710 "Door Hardware." Lubricate operating hardware and other moving parts according to hardware manufacturers' written instructions.
 - 1. Install surface-mounted hardware according to manufacturer's written instructions using concealed fasteners to greatest extent possible.
 - 2. Set aluminum thresholds in bed of silicone sealant.
- G. Install glazing to comply with requirements of Division 8 Section "Glazing," unless otherwise indicated.
 - 1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 2. Install structural silicone sealant according to sealant manufacturer's written instructions.
 - 3. Mechanically fasten glazing in place until structural sealant is cured.
 - 4. Remove excess sealant from component surfaces before sealant has cured.
- H. Install perimeter sealant to comply with requirements of Division 7 Section "Joint Sealants," unless otherwise indicated.
- I. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances:
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8 inch in 12 feet; 1/4 inch over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch.
 - 3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch.

3.3 ADJUSTING AND CLEANING:

- A. Adjust doors and hardware to provide tight fit at contact points and weather stripping, smooth operation, and weathertight closure.
- B. Remove excess sealant and glazing compounds, and dirt from surfaces.

3.4 PROTECTION:

- A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure entrance and storefront systems are without damage or deterioration at the time of Substantial Completion.

END OF SECTION 084113

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. Interior all-glass entrance doors.
 - 2. Interior all-glass sliding doors.
- B. Related Requirements:
 - 1. Section 055000 "Metal Fabrications" for overhead-steel support for all-glass systems.
- C. Alternates: Refer to Division 1 Section "Alternates" for description of Work in this Section affected by alternates.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.
- B. Shop Drawings: For all-glass entrances.
 - 1. Include plans, elevations, and sections.
 - 2. Include details of fittings and glazing, including isometric drawings of rail fittings.
 - 3. Door hardware locations, mounting heights, and installation requirements.
- C. Samples for Initial Selection: For each type of exposed finish indicated.

- D. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.
 - 1. Metal Finishes: 6-inch- (150-mm-) long sections of rail fittings, accessory fittings, and other items.
 - 2. Glass: 6 inches (150 mm) square, showing exposed-edge finish.
 - 3. Door Hardware: For exposed door hardware of each type, in specified finish, full size.

- E. Fabrication Sample: Continuous rail fitting at bottom, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
 - 1. Joinery.
 - 2. Anchorage.
 - 3. Glazing.

- F. 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 sidelights, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

- G. Delegated-Design Submittal: For all-glass systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For all-glass systems, for tests performed by manufacturer and witnessed by a qualified testing agency.

- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

- 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.

1.8 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical all-glass system as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Failure of operating components.
 - 2. Warranty Period: Two years from date of Substantial Completion, except as follows:
 - a. Concealed Floor Closers: Five 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 014000 "Quality Requirements," to design all-glass entrances.
- B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 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. Alpha Door & Rail, Inc.
 - 2. Arch Aluminum & Glass Co., Inc.
 - 3. Avanti Systems, Inc.
 - 4. Blumcraft of Pittsburgh; C.R. Laurence Co, Inc.
 - 5. Doralco Architectural Metals.
 - 6. Oldcastle BuildingEnvelope.
 - 7. Virginia Glass Products Corporation.
 - 8. Vitro America .

- B. All doors provided by this Section shall be from the same manufacturer.
 - 1. Swinging All-Glass Entrances:
 - a. Basis of design:
 - 1) Dry Glaze Slender Profile Door Rail System for heavy tempered glass manufactured by C.R. Laurence Co., Inc. (CRL)

 - 2. Bottom Roller Sliding Glass Panel Partitions:
 - a. Basis of Design:
 - 1) SSR Rolling Sliding Door System; C.R. Laurence Co, Inc. (CRL).

2.3 METAL COMPONENTS

- A. Fitting Configuration:
 - 1. Manual-Swinging, All-Glass Entrance Doors, Sidelights: Continuous rail fitting at top and bottom.

- B. Rail Fittings:
 - 1. Material: Painted aluminum.
 - 2. Height:
 - a. Top Rail: 1 inch (25 mm).
 - b. Bottom Rail: 1 inch (25 mm).

 - 3. Profile: Square.
 - 4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.

C. Accessory Fittings: Match rail-fitting metal and finish for the following:

1. Overhead doorstop.
2. Center-housing lock.
3. Glass-support-fin brackets.

D. Anchors and Fastenings: Concealed.

E. Materials:

1. Aluminum: ASTM B 221 (ASTM B 221M), with strength and durability characteristics of not less than Alloy 6063
 - a. Finish: Painted black.

2.4 GLASS

A. Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.

1. Class 1: Clear monolithic.
 - a. Thickness: 1/2 inch (13 mm).
 - b. Locations: As indicated.
2. Exposed Edges: Machine ground and flat polished.
3. Butt Edges: Flat ground.
4. Corner Edges: Lap-joint corners with exposed edges polished.

2.5 ENTRANCE DOOR HARDWARE

A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of rail fittings.

B. Concealed Floor Closers and Top Pivots: Center hung; BHMA A156.4, Grade 1; including cases, bottom arms, top walking beam pivots, plates, and accessories required for complete installation.

1. Swing: Single acting.
 - a. Positive Dead Stop: Coordinated with hold-open angle if any, or at angle selected.
2. Hold Open: Automatic, at angle selected.
3. Opening-Force Requirements:
 - a. Accessible Interior Swinging Doors: Not more than 5 lbf (22.2 N) to fully open door.

- C. Push-Pull Set: Pull not required at glazing. Provide finger pull in bottom rail.
- D. Single-Door and Active-Leaf Locksets: Bottom-fitting or bottom-rail deadbolt.
 - 1. Deadbolt operated by key outside and key inside.
- E. Cylinders: As specified in Section 087100 "Door Hardware."
- F. Rolling Door Hardware:
 - 1. Top Track Assembly: Extruded aluminum pre-fabricated in straight configuration for guiding glass panels.
 - a. Track size: Per architect's drawings .
 - 2. Heavy-Duty Roller Assembly: Rollers provide smooth movement of glass panels. Two (2) roller assemblies per panel. Each assembly is capable of supporting 125 lbs. (56.7 kg) each.
 - 3. Track - standard: Extruded aluminum with stainless steel roller guide cover available up to 10 foot (3.05 m) long.
 - 4. Lock cylinders: Keyed cylinders, finish to match finish of rail, unless noted otherwise.
 - 5. Finish: Match finish of rails

2.6 FABRICATION

- A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
 - 1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install all-glass systems and associated components according to manufacturer's written instructions.
- B. Set units level, plumb, and true to line, with uniform joints.

- C. Maintain uniform clearances between adjacent components.
- D. Lubricate hardware and other moving parts according to manufacturer's written instructions.
- E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

3.3 ADJUSTING AND CLEANING

- A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points and weather stripping.
 - 1. For all-glass entrance doors accessible to people with disabilities, adjust closers to provide a three-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.
- B. Remove excess sealant and glazing compounds and dirt from surfaces.

END OF SECTION 084226

SECTION 084229

AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior and interior, sliding, power-operated automatic entrances.
- B. Related Sections:
 - 1. Division 03 Section "Cast-in-Place Concrete" for forming recesses in concrete for recessed thresholds.
 - 2. Division 26 Sections for electrical connections including conduit and wiring for automatic entrance operators.

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.
- C. IBC: International Building Code.
- D. Safety Device: Device that, to avoid injury, prevents a door from opening or closing.
- E. For automatic door terminology, refer to BHMA A156.10 for definitions of terms.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- C. Operating Temperature Range: Provide automatic entrances that operate within minus 20 to plus 122 deg F (minus 29 to plus 50 deg C).
- D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. (6.4 L/s x sq. m) of fixed entrance system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).

- E. Opening-Force Requirements:
 - 1. Breakaway Device for Power-Operated Doors: Not more than 50 lbf (222 N) required for a breakaway door or panel to open.
 - 2. Accessible Interior Doors: Not more than 5 lbf (22 N) to fully open door.
- F. Entrapment Force Requirements:
 - 1. Power-Operated Sliding Doors: Not more than 30 lbf (133 N) required to prevent stopped door from closing.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrances. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For automatic entrances. Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work.
 - 1. Wiring Diagrams: For power, signal, and control wiring.
 - 2. Activation and safety devices.
 - 3. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Qualification Data: For Installer, manufacturer and certified inspector.
- F. Product Certificates: For each type of automatic entrance, from manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for automatic entrances.
- H. Field quality-control reports.
- I. Maintenance Data: For automatic entrances, safety devices, and control systems to include in maintenance manuals.
- J. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer with company certificate issued by AAADM.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project and who employs a certified inspector.
 - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- C. Certified Inspector Qualifications: Certified by AAADM.

- D. Source Limitations for Automatic Entrances: Obtain automatic entrances from single source from single manufacturer.
- E. 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.
- F. Power-Operated Door Standard: BHMA A156.10.
- G. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to automatic entrances including, but not limited to, the following:
 - a. Structural load limitations.
 - b. Construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - c. Coordination with electrical, glazing, and other trades.
 - d. Required testing, inspecting, and certifying procedures.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings to receive automatic entrances by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate sizes and locations of recesses in concrete floors for recessed sliding tracks that control automatic entrances. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Templates: Obtain templates for doors, frames, and other work specified to be factory prepared for installing automatic entrances, and distribute to parties involved. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.
- C. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrances with hardware required for rest of Project.
- D. Electrical System Roughing-in: Coordinate layout and installation of automatic entrances with connections to power supplies.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of operators, controls, and hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show 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.

1.10 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide 12 months' full maintenance by skilled employees of automatic entrance Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper automatic entrance operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
 - 1. Engage a certified inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
 - 2. Perform maintenance, including emergency callback service, during normal working hours.
 - 3. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - 2. Sheet and Plate: ASTM B 209 (ASTM B 209M).
- B. Steel Reinforcement: With manufacturer's standard corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- C. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- D. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- E. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness, in entrance manufacturer's standard thickness.
- F. Glazing: As specified in Division 08 Section "Glazing."
- G. Sealants and Joint Fillers: As specified in Division 07 Section "Joint Sealants."
- H. Nonmetallic, Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout; complying with ASTM C 1107; of consistency suitable for application.

- I. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos; formulated for 30-mil (0.76-mm) thickness per coat.
- J. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.2 SLIDING AUTOMATIC ENTRANCES

- A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.
- B. Exterior Sliding Automatic Entrance: **Door #S-1.**
 - 1. Basis-of-Design Product: **Stanley Access Technologies; Div. of The Stanley Works; Dura-Glide 2000** or a comparable product by one of the following:
 - a. Besam Automated Entrance Systems, Inc.
 - b. DORMA Automatics; Div. of DORMA Group North America.
 - c. Gildor, Inc.
 - d. Horton Automatics; Div. of Overhead Door Corporation.
 - e. KM Systems, Inc.
 - f. Nabco Entrances Inc.
 - g. Sierra Automatic Doors, Inc.
 - h. Tormax Technologies, Inc.
 - 2. Configuration: Biparting-sliding doors, with two sliding leaves, transom, and sidelites on each side.
 - a. Traffic Pattern: Two way.
 - b. Emergency Breakaway Capability: Sliding leaves only.
 - c. Mounting: Between jambs.
 - 3. Operator Features:
 - a. Power opening and closing.
 - b. Drive System: Chain or belt.
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. On-off/hold-open switch to control electric power to operator, key operated.
 - g. Energy-conservation switch that reduces door-opening width.
 - 4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
 - a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
 - 5. Sliding Door Threshold: Manufacturer's standard threshold members and bottom-guide track system, with stainless-steel, ball-bearing-center roller wheels.
 - a. Configuration: Saddle-type threshold across door opening and recessed guide track system at sidelites.

6. Combination Activation and Safety Device: Combination motion/presence sensor.
7. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
8. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.
9. Finish: ~~Finish framing, door(s), sidelite(s), and header with finish matching adjacent storefront.~~ Clear anodized.

C. Interior Sliding Automatic Entrance: Door #S-2.

1. Basis-of-Design Product: **Stanley Access Technologies; Div. of The Stanley Works; Dura-Glide 2000** or a comparable product by one of the following:
 - a. Besam Automated Entrance Systems, Inc.
 - b. DORMA Automatics; Div. of DORMA Group North America.
 - c. Gildor, Inc.
 - d. Horton Automatics; Div. of Overhead Door Corporation.
 - e. KM Systems, Inc.
 - f. Nabco Entrances Inc.
 - g. Sierra Automatic Doors, Inc.
 - h. Tormax Technologies, Inc.
2. Configuration: Biparting-sliding doors, with two sliding leaves, transom, and sidelites on each side.
 - a. Traffic Pattern: Two way.
 - b. Emergency Breakaway Capability: Sliding leaves only.
 - c. Mounting: Between jambs.
3. Operator Features:
 - a. Power opening and closing.
 - b. Drive System: Chain or belt.
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. On-off/hold-open switch to control electric power to operator, key operated.
 - g. Energy-conservation switch that reduces door-opening width.
4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
 - a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
5. Sliding Door Threshold: Manufacturer's standard threshold members and bottom-guide track system, with stainless-steel, ball-bearing-center roller wheels.
 - a. Configuration: Saddle-type threshold across door opening and recessed guide track system at sidelites.
6. Combination Activation and Safety Device: Combination motion/presence sensor.
7. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
8. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians

- 9. in presence zone and to prevent door from closing.
Finish: Clear anodized.

D. Interior Sliding Automatic Entrance: Door #S-3.

1. Basis-of-Design Product: **Stanley Access Technologies; Div. of The Stanley Works; Dura-Glide 3000** or a comparable product by one of the following:
 - a. Besam Automated Entrance Systems, Inc.
 - b. DORMA Automatics; Div. of DORMA Group North America.
 - c. Gildor, Inc.
 - d. Horton Automatics; Div. of Overhead Door Corporation.
 - e. KM Systems, Inc.
 - f. Nabco Entrances Inc.
 - g. Sierra Automatic Doors, Inc.
 - h. Tormax Technologies, Inc.
2. Configuration: Single-telescoping door, with one sliding leaf, transom, and sidelite.
 - a. Traffic Pattern: Two way.
 - b. Emergency Breakaway Capability: Sliding leaf and sidelite.
 - c. Mounting: Between jambs.
3. Operator Features:
 - a. Power opening and closing.
 - b. Drive System: Chain or belt.
 - c. Adjustable opening and closing speeds.
 - d. Adjustable hold-open time between 0 and 30 seconds.
 - e. Obstruction recycle.
 - f. On-off/hold-open switch to control electric power to operator, key operated.
 - g. Energy-conservation switch that reduces door-opening width.
4. Sliding Door Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
 - a. Rollers: Minimum of two ball-bearing roller wheels and two antirise rollers for each active leaf.
5. Sliding Door Threshold: Manufacturer's standard threshold members and bottom-guide track system, with stainless-steel, ball-bearing-center roller wheels.
 - a. Configuration: Saddle-type threshold across door opening and recessed guide track system at sidelites.
6. Combination Activation and Safety Device: Combination motion/presence sensor.
7. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
8. Safety Devices: Two photoelectric beams mounted in sidelite jambs to detect pedestrians in presence zone and to prevent door from closing.
9. Finish: Dark anodized bronze.

2.3 ENTRANCE COMPONENTS

- A. Framing and Transom Members: Manufacturer's standard extruded aluminum, minimum 0.125

inch (3.2 mm) thick and reinforced as required to support imposed loads.

1. Nominal Size: 1-3/4 by 4-1/2 inches (45 by 115 mm).
 2. Extruded Glazing Stops and Applied Trim: Minimum 0.062-inch (1.6-mm) wall thickness.
- B. Glass Panels and Rails: Manufacturer's standard 1 3/4 inch (45 mm) thick extruded-aluminum tubular rail members. Rail members to be specifically designed by automatic entrance manufacturer for use with glass panel automatic entrance systems. Fasten rails to glass panels by mechanical clamp; adhesive systems not acceptable.
1. Top Rail: 6 inch (152 mm) nominal height.
 2. Stile Design: Narrow stile; 2 inch (51 mm) nominal width
 3. Bottom Rail: 6 inch (152 mm) nominal height.
 4. Glazing: Provide glazing for sliding automatic entrances as follows:
 - a. Provide safety glass complying with ANSI Z97.1 and CPSC 16 CFR 1201 for Category II materials.
 - b. Exterior Door Glazing: Furnished under Division 8 Section Glazing. All Glazing furnished under separate section shall be 1 inch (25 mm) insulated low-e, fully tempered, hermetically sealed.
 - c. Interior Door Glazing: Furnished under Division 8 Section Glazing. All Glazing furnished under separate section shall be 1/4 inch (6 mm), fully tempered.
- C. Transom: Manufacturer's standard 1-3/4-inch- (45-mm-) deep transom with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular stile and rail members matching door design and finish.
1. Glazing Stops and Gaskets: Same materials and design as for stile and rail door.
 2. Muntin Bars: Horizontal tubular rail members for each sidelite; match stile design.
 3. Glazing: Furnished under Division 8 Section Glazing.
- D. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick, extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
1. Mounting: Concealed, with one side of header flush with framing.
 2. Capacity: Capable of supporting doors up to 220 lb (100 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.
 - a. Provide sag rods for spans exceeding 14 feet (4.3 m).
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Signage: Affixed to both sides of each door as required by BHMA A156.10 for type of door and its operation.
1. Application Process: Decals.
 2. Provide sign materials with instructions for field application after glazing is installed.

2.4 DOOR OPERATORS AND ACTIVATION AND SAFETY DEVICES

- A. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
 - 1. Door Operator Performance: Provide door operators that will open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
 - 2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.
- B. Combination Motion/Presence Sensors: Flush mounted, self-contained units; consisting of both motion and presence sensors in a single metal or plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
 - 1. Motion Sensor: K-band-frequency, microwave-scanner units; with relay hold time of not less than 2 to 10 seconds.
 - a. Provide capability for switching between bidirectional and unidirectional detection.
 - b. For one-way-traffic entrances, sensor on egress side shall not be active when doors are fully closed.
 - 2. Presence Sensor: Infrared-scanner units; with relay hold time of not less than 2 to 10 seconds. Sensors shall remain active at all times.
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.
- D. Opening-Width Control: Two-position switch that in the normal position allows sliding doors to travel to full opening width and in the alternate position reduces opening to a selected partial opening width.

2.5 HARDWARE

- A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish unless otherwise indicated.
- B. Breakaway Device for Power-Operated Doors: Provide breakaway device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be 50 lbf (222 N) according to BHMA A156.10. Interrupt powered operation of door operator while in breakaway mode.
- C. Deadlocks: Manufacturer's standard deadbolt operated by exterior cylinder and interior thumb turn, with minimum 1-inch- (25-mm-) long throw bolt; BHMA A156.5, Grade 1.
 - 1. Cylinders: As specified in Division 08 Section "Door Hardware."
 - a. Keying: Integrate into building master key system.
 - 2. Two-Point Locking for Sliding Doors: Mechanism in stile of active door leaf that automatically extends second lockbolt into overhead carrier assembly.
- D. Pull Handles: As selected by Architect from manufacturer's full range of pull handles and plates.
- E. Thresholds: BHMA A156.21, extruded-aluminum raised thresholds; with beveled edges with a

slope of not more than 1:2 and a maximum height of 1/2 inch (13 mm). Provide cutouts as required for door operating hardware.

- F. Weather Stripping: Manufacturer's standard replaceable components.
 - 1. Sliding Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of flexible PVC.
 - 2. Weather Sweeps: Manufacturer's standard adjustable nylon brush sweep mounted to underside of panel bottom.

2.6 FABRICATION

- A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
 - 1. Form aluminum shapes before finishing.
 - 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 - 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match framing.
 - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - b. Reinforce members as required to receive fastener threads.
 - 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
 - 1. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
 - 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
 - 3. Form profiles that are sharp, straight, and free of defects or deformations.
 - 4. Provide components with concealed fasteners and anchor and connection devices.
 - 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
 - 6. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within system to the exterior.
 - 7. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
 - 8. Allow for thermal expansion of exterior units.
- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."
- F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.

1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors.

G. Activation and Safety Devices:

1. General: Factory install devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- 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.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 1. Door #S-1.
 2. Door #S-2.
- B. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
 1. Dark Bronze.
 2. Door #S-3.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.

2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
 4. Level recesses for recessed thresholds using nonshrink grout.
 5. Provide thresholds at exterior doors and where indicated.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Activation and Safety Devices: Install and adjust devices to provide detection field and functions indicated.
- E. Glazing: Install glazing as specified in Division 08 Section "Glazing."
- F. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide weathertight installation.
1. Set bottom-guide track system, framing members and flashings in full sealant bed.
 2. Seal perimeter of framing members with sealant.
- G. Signage: Apply signage on both sides of each door as required by referenced door standards.
- H. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 FIELD QUALITY CONTROL

- A. Inspection: Engage Installer's certified inspector to test and inspect automatic entrances and prepare test and inspection reports.
1. Certified inspector shall test and inspect each automatic entrance to determine compliance of installed systems with applicable BHMA standards.
 2. Inspection Report: Certified inspector shall submit report in writing to Architect and Contractor within 24 hours after inspection.
- B. Work will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING

- A. Adjust door operators, controls, and hardware for smooth and safe operation and for weathertight closure; comply with requirements in BHMA A156.10.
- B. Lubricate operating hardware and other moving parts as recommended by manufacturer.
- C. Readjust door operators and controls after repeated operation of completed installation equivalent to 3 days' use by normal traffic (100 to 300 cycles). Lubricate hardware, operating equipment, and other moving parts.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.5 CLEANING AND PROTECTION

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.
 - 1. Comply with requirements in Division 08 Section "Glazing" for cleaning and maintaining glass.

3.6 DEMONSTRATION

- A. Engage a certified inspector to train Owner's maintenance personnel to adjust, operate, and maintain automatic entrances.

END OF SECTION 084229

SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section includes the following:
 - 1. Glazed aluminum curtain walls.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 07 Section "Joint Sealants" for joint sealants installed as part of glazed aluminum curtain wall system.
 - 2. Division 08 Section "Aluminum Framed Entrances and Storefronts."
 - 3. Division 09 Section "Glazed Aluminum Curtain Walls."
 - 4. Division 08 Section "Glazing."

1.3 PREINSTALLATION MEETINGS:

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

1.4 ACTION SUBMITTALS:

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Sustainable Design Submittals:
 - 1. Product Data: For sealants, indicating VOC content.
 - 2. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.

2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- 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. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS:

- A. Preconstruction Laboratory Mockup Testing Submittals:
 1. Testing Program: Developed specifically for Project.
 2. Test Reports: Prepared by a qualified preconstruction testing agency for each mockup test.
 3. Record Drawings: As-built drawings of preconstruction laboratory mockups showing changes made during preconstruction laboratory mockup testing.
- B. Qualification Data: For Installer.
- C. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- D. Product Test Reports: For glazed aluminum curtain walls, for tests performed by manufacturer and witnessed by a qualified testing agency.

- E. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.*
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS:

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.7 QUALITY ASSURANCE :

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated and accredited by IAS or ILAC Mutual Recognition Arrangement as complying with ISO/IEC 17025.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- D. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of curtain wall assemblies.

1.8 MOCKUPS:

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical 5'-0" x 8'-0" wall area.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY:

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 2. Warranty Period: 10 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 014000 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.

C. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm).
 - a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.
3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
 - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch (6.35-mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans less than 11 feet 8-1/4 inches (3.6 m).

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:
 - a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
 2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- I. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
- J. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.37 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.26 as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 15 as determined according to NFRC 500.
- K. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows:
1. Outdoor-Indoor Transmission Class: Minimum 26.
- L. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 2. Thermal Cycling: 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).

2.2 MANUFACTURERS:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Series 1600; Kawneer North America; an Alcoa company**, or comparable product by one of the following:
 - 1. EFCO Corporation.
 - 2. Oldcastle Building Envelope.
 - 3. Wausau Window and Wall Systems; Apogee Wausau Group.
 - 4. YKK AP America Inc.
- B. Source Limitations: Obtain all components of curtain wall system, including framing, venting windows, entrances 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 improved.
 - 2. Glazing System: Retained mechanically with gaskets on four sides.
 - 3. Glazing Plane: Front.
 - 4. Finish: High-performance organic finish.
 - 5. Fabrication Method: Factory-fabricated unit and mullion system.
- B. Pressure Caps: Fiberglass components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Head Receptors: Provide manufacturer's standard thermally broken head receptors that are compatible with curtain wall framing.
- E. 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 ENTRANCES:

- A. Entrances: Comply with Section 084113 "Aluminum-Framed Entrances and Storefronts."

2.5 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: Comply with Section 088000 "Glazing."
 1. Sealant shall have a VOC content of 250 g/L or less.
 2. Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
 1. Color: Match structural sealant.

2.6 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, fabricated from 300 series stainless steel.

- 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: Dead-soft, 0.018-inch- (0.457-mm-) thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.7 FABRICATION:

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 7. Components curved to indicated radii.
- D. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using shear-block system.
- F. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.

3. Preparation includes, but is not limited to, cleaning and priming surfaces.
 4. Seal joints watertight unless otherwise indicated.
 5. Install glazing to comply with requirements in Section 088000 "Glazing."
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES:

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION:

- A. General:
1. Comply with manufacturer's written instructions.
 2. Do not install damaged components.
 3. Fit joints to produce hairline joints free of burrs and distortion.
 4. Rigidly secure nonmovement joints.
 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install 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."
 - 1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- 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.

3.4 ERECTION TOLERANCES:

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet (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.

END OF SECTION 084413

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. Sliding, transaction window.
- B. Related Requirements:
 - 1. Division 7 Section "Joint Sealants" for joint sealants installed as part of transaction window systems.
 - 2. Division 8 Section "Glazing."

1.3 COORDINATION:

- A. Coordinate installation of anchorages for transaction window. 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 adjacent construction. Deliver such items to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS:

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

1.5 ACTION SUBMITTALS:

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for window units.
- B. Shop Drawings: For transaction windows.
 - 1. Include plans, elevations, sections, and attachments to other work.
 - 2. Full-size section details of framing members, including internal armoring, reinforcement, and stiffeners.
 - 3. Hardware for sliding window units.
 - 4. Glazing details.

- C. Samples for Initial Selection: For frame members with factory-applied color finishes.

1.6 INFORMATIONAL SUBMITTALS:

- A. Sample Warranty: For special warranty.

1.7 QUALITY ASSURANCE:

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation of units required for this Project.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - 4. AWS D1.6, "Structural Welding Code - Stainless Steel."

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Pack transaction windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.
- B. Label transaction window packaging with drawing designation.
- C. Store crated transaction windows on raised blocks to prevent moisture damage.

1.9 FIELD CONDITIONS:

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.10 WARRANTY:

- A. Special Warranty: Manufacturer agrees to repair or replace transaction windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including deflections exceeding 1/4 inch (6 mm).
 - b. Failure of welds.
 - c. Faulty operation of sliding window hardware.
 - d. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - 2. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SLIDING, TRANSACTION WINDOWS:

- A. Provide horizontal-sliding, transaction windows.
 - 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. Daisy Sliding Window, D1041A; C.R. Laurence Architectural Products.
- B. Configuration: Two horizontal-sliding glazed panels.
- C. Framing: Fabricate perimeter framing, mullions, and glazing stops from aluminum as follows:
 - 1. Profile: Manufacturer's standard.
 - 2. Depth: Manufacturer's standard.
- D. Head and Jamb Framing: Designed for gasket glazing.
- E. Sill: By others.
- F. Sliding Window Hardware: Provide roller track designed for overhead support of two-wheel carriage supporting horizontal-sliding glazed panel. Provide manufacturer's standard pull and lock with two keys for horizontal-sliding glazed panel.
- G. Glazing and Glazing Materials: Comply with requirements in Division 08 Section "Glazing."
 - 1. Glass: 5/16" laminated, clear.
- H. Materials:
 - 1. Aluminum Extrusions: ASTM B 221 (ASTM B 221M). Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength.

2.2 FABRICATION:

- A. General: Fabricate transaction windows to provide a complete system for assembly of components and anchorage of window units.
 - 1. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.
 - 2. Prepare transaction windows for glazing unless preglazing at the factory is indicated.
- B. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.

- C. Glazing Stops: Finish glazing stops to match transaction window framing.
- D. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- E. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- F. Preglazed Fabrication: Preglaze window units at factory, where required for applications indicated. Comply with requirements in Division 08 Section "Glazing."

2.3 GENERAL FINISH REQUIREMENTS:

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.4 ALUMINUM FINISHES:

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
 - 1. Finish: Satin anodized.

2.5 ACCESSORIES:

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers and with a proven record of compatibility with surfaces contacted in installation.
 - 1. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
 - 2. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
 - 3. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - 4. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

- C. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633; provide sufficient strength to withstand design pressures indicated.
- D. Sealants: For sealants required within fabricated transaction windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.

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 transaction windows.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of transaction window connections before transaction window installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of transaction windows.
- D. Inspect built-in and cast-in anchor installations, before installing transaction windows, to verify that anchor installations comply with requirements. Prepare inspection reports.
 - 1. Remove and replace anchors where inspections indicate that they do not comply with specified requirements. Reinspect after repairs or replacements are made.
 - 2. Perform additional inspections to determine compliance of replaced or additional work. Prepare anchor inspection reports.
- E. For glazing materials whose orientation is critical for performance, verify installation orientation.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Coordination: Furnish layouts for cast-in-place anchors, clips, and other transaction window anchors whose installation is specified in other Sections.
 - 1. Furnish cast-in-place anchors and similar devices to other trades for installation well in advance of time needed for coordinating other work.

3.3 INSTALLATION:

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing transaction windows to in-place construction. Include threaded fasteners for inserts, transaction fasteners, and other connectors.

- B. Glazed Framing: Provide gasket-glazed framing. Comply with installation requirements in Division 08 Section "Glazing."
- C. Removable Glazing Stops and Trim: Fasten components with security fasteners.
- D. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners.
- E. Sealants: Comply with requirements in Division 07 Section "Joint Sealants" for installing sealants, fillers, and gaskets.
 - 1. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
 - 2. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.
- F. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.4 FIELD QUALITY CONTROL:

- A. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.

3.5 ADJUSTING:

- A. Adjust horizontal-sliding, transaction transaction windows to provide a tight fit at contact points for smooth operation and a secure enclosure.
- B. Remove and replace defective work, including transaction windows that are warped, bowed, or otherwise unacceptable.

3.6 CLEANING AND PROTECTION:

- A. Clean surfaces promptly after installation of transaction windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
 - 1. Lubricate sliding transaction window hardware.
 - 2. Lubricate transaction drawer hardware.
- B. Clean glass of preglazed transaction windows promptly after installation. Comply with requirements in Division 08 Section "Glazing" for cleaning and maintenance.
- C. Provide temporary protection to ensure that transaction windows are without damage at time of Substantial Completion.

3.7 DEMONSTRATION:

- A. Train Owner's maintenance personnel to adjust, operate, and maintain operable transaction windows.

END OF SECTION 085653

SECTION 087100
DOOR HARDWARE

PART 1 - GENERAL

1.01 WORK INCLUDED

The work in this section shall include the furnishing of all items of door hardware as hereinafter specified, or obviously necessary to complete the building, except those items which are specifically excluded from this section of the specification.

1.02 DESCRIPTION OF WORK

Door Hardware - Hardware used in building construction but particularly that used on or in connection with doors and frames, cabinets and other movable members. It also has a finished appearance as well as functional purpose and may be considered as a part of the decorative treatment of a room or building.

1.03 RELATED WORK

- A. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Sections in Division 1 of these specifications.
- B. Related Sections:
 - Section 081000 - Steel Doors and Frames
 - Section 081000 – Standard Steel Frames
 - Section 082100 – Flush Wood Doors
 - Section 083300 - Coiling Doors and Grilles

1.04 COORDINATION

- A. Schedule coordination meeting to clarify sub-contractor and supplier requirements to provide a complete and functioning access control system.

1.05 QUALITY ASSURANCE

- A. Hardware has been specified herein by manufacturer's name, brand and catalog numbers for the purpose of establishing a basis for quality, finish, design and operational function. To insure a uniform basis of acceptable material, it is the intention that only manufacturer's items specified as "Acceptable and Approved" be furnished for use on this project. Obtain each type of hardware (latch and lock sets, hinges, exit devices closers) from single manufacturer, although several may be indicated as offering products complying with requirements.
- B. *Substitutions:* Request for substitutions of items of hardware not listed as "Acceptable and Approved" shall be made to the Architect no later than ten (10)

days prior to bid opening. Approval of substitutions will only be in writing or by addenda. Request for substitutions shall be accompanied by samples and/or detailed information as to the manufacturer of the product.

- C. *Underwriters' Laboratories Requirements:* Hardware for openings classed as requiring a UL label in the door schedule, or by code, shall be furnished and installed to meet the applicable requirements of NFPA 80. Hardware shall be UL listed for usage with types and sizes of fire doors specified and scheduled. Products tested shall meet requirements of UBC 7-2-1997 / UL10C
- D. *Accessibility Standards:* Hardware shall be in conformance with Article 9102, Texas Civil Statutes, Elimination of Architectural Barriers Act of Texas.
 - 1. Door Closers: The sweep period of closers shall be adjusted so that from an open position of 90 degrees, the door will take at least five seconds to move to an open position of approximately 12 degrees.
 - 2. The maximum force for pushing or pulling open door shall be as follows:
 - a. Exterior hinged doors: Not to exceed 8.5 lbf.
 - b. Sliding, folding, and interior hinged doors: Not to exceed 5 lbf.
 - c. Fire doors: Adjusted to meet minimum closing force permitted by governing fire safety standards.
- E. *Federal Accessibility Standards:* Hardware shall be in accordance will all requirements of the Americans With Disabilities Act - 1990.
- F. *Supplier:* A recognized builders hardware supplier who has been furnishing hardware in the project's vicinity for a period of not less than two (2) years, and who is, or has in employment, a Hardware Consultant (AHC) in good standing as certified by the Door and Hardware Institute. This consultant shall have experience in the preparation of architectural hardware specifications, estimating, detailing, ordering, servicing of architectural hardware in all its branches and will be available at reasonable times during the course of the work for project hardware consultation to the Owner, Architect and Contractor. It is the hardware distributor's responsibility to coordinate the hardware specified to work with the Aluminum doors.
- G. *Pre-Installation Instructional Meeting:* Contractor shall schedule and hold a pre-installation meeting that includes the Contractor, the Architect and/or his chosen representative, the Hardware Supplier, and all installers of hardware. Instructional meeting shall be conducted by the Hardware Supplier, covering proper installation of all items of hardware to be incorporated into the Project.
- H. *Installer:* Firm with a minimum of five years of documented experience in installing the types and grade of hardware being incorporated into the Project. Three written

references from Construction Administrators of previous projects required for the Architect's review before installation Contract or Subcontract is executed.

- I. Prototype Installations: One of each type of the following hardware installations shall be performed to the Architect's (and/or his designated representative's) approval before any installations of like-type applications are performed:
 - 1. One exterior door pair with exit devices
 - 2. One exterior single door with an exit device
 - 3. One single classroom door
 - 4. One interior pair of doors with vertical rod exit devices

1.06 REFERENCES

- A. Door Hardware in this section shall meet the following as established by the American National Standards Institute, Inc. (ANSI) which is sponsored by the Builders Hardware Manufacturers Association, Inc., (BHMA). Product tests are to be administered by the ETL Testing Laboratories, Inc., or other official testing laboratories which have been designed by BHMA for the testing of ANSI standards latest revision will be in effect.
- B.

| | |
|----------------------------------|--------------|
| Materials and Finishes | BHMA 1301 |
| Butts and Hinges | ANSI A156.1 |
| Locks and Lock Trim | ANSI A156.2 |
| Exit Devices | ANSI A156.3 |
| Door Controls-Closers | ANSI A156.4 |
| Auxiliary Lock & Assoc. Products | ANSI A156.5 |
| Architectural Door Trim | ANSI A156.6 |
| Template Hinge Dimensions | ANSI A156.7 |
| Door Controls-Overhead Holders | ANSI A156.8 |
| Mortise Locks and Latches | ANSI A156.13 |
- C. *Listed Hardware:* Hardware which is to be installed in or on fire labeled doors and frames, Class A or lesser, single or pairs shall be tested and listed by Underwriters Laboratories and/or Warnock Hersey Fire Laboratories Division. Exit devices which are to be used as panic hardware shall be tested and listed in Underwriters Laboratories "Accident Equipment List-Panic Hardware". All listed hardware shall be in compliance with National Fire Protection Association (NFPA) Standard Number 80 IBC current year adopted and be properly stamped or labeled for easy identification.

1.07 SUBMITTALS

- A. The door hardware supplier shall, after award of a formal contract, submit to the Architect, six (6) complete typewritten copies of the proposed Door Hardware Schedule for approval. This schedule shall be prepared using the "Sequence and Format for the Hardware Schedule" as approved and recommended by the Door and Hardware Institute (DHI).
- B. When submitting schedules for approval, include six (6) copies of cut sheets on each hardware item proposed. Index it with the use of number or letters or a combination of both, with the hardware schedule. The index numbers/letters are to be in the right hand column on the same line as the respective manufacturer's numbers shall be indexed even when appearing more than once.
- C. *Samples:* As part of this contract, if requested, the hardware supplier shall provide the Architect with one sample of each item of door hardware that is to be furnished for this project.
- D. *Templates:* The hardware supplier shall provide necessary templates and/or physical hardware to all trades requiring them in order that they may cut, reinforce or otherwise prepare their material or product to receive the hardware item. If physical hardware is required by any manufacturer, the hardware supplier shall ship to them such hardware via prepaid freight in sufficient time to prevent any delay in the execution of their work.

1.08 DELIVERY, STORAGE AND HANDLING

- A. All items of hardware to be delivered to the jobsite shall be completely packaged with all necessary screws, bolts, miscellaneous parts, instructions and where necessary installation templates for manufacturer's suggested installation. They are to be clearly labeled as to conveniently identify them and their intended location in the building.
- B. A representative of the General Contractor shall receive the hardware when delivered at the jobsite. A dry locked storage space complete with shelving, shall be set aside for the purpose of unpacking, sorting out, checking and storage.
- C. Door Hardware shall be delivered to the General Contractor by the hardware supplier. Direct factory shipments to the jobsite are not acceptable.
- D. The hardware shall be jointly inventoried by representatives of the General Contractor and the Hardware Supplier.
- E. Items damaged in shipment shall be replaced promptly and with proper material without additional cost to the General Contractor.
- F. All hardware shall be handled in a manner to minimize marring, scratching or damage.

- G. Store and handle all materials strictly according to the manufacturer's instructions.

1.09 WARRANTY

Door Closers shall carry a limited warranty against defects in workmanship and operation for a period of five (5) years from the date of acceptance. The balance of door hardware shall carry a limited warranty against defects in workmanship and operation for a period of one (1) year from date of acceptance. No liability is to be assumed where damage or faulty operation is due to abuse, improper usage, improper installation or failure to exercise normal maintenance.

PART 2 - PRODUCTS

2.01 FINISH OF HARDWARE

- A. Finish of items shall be as specified under the door hardware sets of this section.
- B. The finish of items not specially mentioned above nor set forth in the schedule shall be US26D, unless shown otherwise.

2.02 HINGES

- A. *Template Hinges:* Provide only template hinges which conform to ANSI A156.7.
- B. Use five-knuckle ball bearing hinges, as indicated in the hardware sets, on heavy doors, doors where high frequency service is expected, doors equipped with door closers, and all labeled doors. (Oil impregnated bearing hinges are not acceptable.)
- C. All hinges to be used on exterior doors or doors subject to special atmospheric conditions, (pool areas, chemical laboratories, sewage disposal plants, etc.) shall be of non-ferrous material, brass, bronze or stainless steel.
- D. Hinge pins, except as otherwise indicated, shall be as follows:
 - 1. Steel hinges: Steel pins
 - 2. Non-ferrous hinges: Stainless steel pins
- E. Sizes of hinges shall be as follows:

| | | |
|------------------------------------|------------------------|-----------------------|
| Door Thickness <u>and Width</u> | Hinge <u>Height</u> | Hinge <u>Width</u> |
| 1 3/4" to 36" | 4½ | 4½ |

- F. Number of hinges per door, provided quantities as follows:
For doors less than 5 feet high: 1 pair
For doors 5 feet to 7 feet 6 inches high: 1 1/2 pair and additional hinge for each additional 2 1/2 feet or fraction thereof.
- G. Where projection of door trim is such as to prevent degree of opening, the proper hinge width shall be provided to allow the door to clear the trim.
- H. Provided above criteria are met, Acceptable and Approved as follows:
- Ives
Hager
Bommer
- I. Continuous Hinges shall be type scheduled and as manufactured by one of the following. Coordinate hinge type with Aluminum door supplier.

ABH
Ives
Hager

2.03 KEYING

- A. All locks and cylinders shall be restricted keyway as instructed by Owner to match existing key system. Stamp all keys with "Do Not Duplicate" on one side and key symbol on the other side. A keying meeting is required prior to ordering cylinders for this project. Submit a separate keying submittal for review and approval.
Furnish "3" Change keys Each Lockset
Furnish "6" Building Master Keys
Furnish "10" Construction Master Keys
Furnish "2" Temp core removal keys
Furnish "2" Permanent core installation keys
All permanent keys to be delivered to Owner.

2.04 MORTISE LOCKS

- A. Locks shall have all functions available in one size case, manufactured from heavy gauge steel, minimum thickness of 3/32", complete chrome plated for corrosion resistance and lubricity of parts. Cases are to be closed on all sides to protect internal parts. Locks are to have adjustable, beveled and armored fronts, standard 2 3/4" backset, a full 3/4" throw two-piece mechanical anti-friction

latchbolt, a one-piece stainless steel 1" throw deadbolt, and shall be available for a minimum door thickness of 1 3/8". Internal parts shall be heavy gauge steel, zinc dichromate plated for corrosion resistance.

- B. All locksets with latchbolts, regardless of trim, shall be listed by Underwriters Laboratories for A label and less class doors, 4' x 8' single or 8' x 8' pair.
- C. Lock trim (knob, lever, sectional or escutcheon) shall be throughbolted through the lock case to assure correct alignment and proper operation.
- D. Locksets shall conform to Federal Specification FF-H-106C, and be certified as meeting ANSI A156.13 Series 1000, Grade 1 requirements, ANSI A117.1, Accessibility Code (lever handle trim), and California State Reference Code, 1989 (formerly Title 19, California State Fire Marshall Standard) (lever handle trim).
- E. Acceptable and Approved: **No Substitutions**

Schlage

2.05 EXIT DEVICES

LOW PROFILE PUSH BAR EXIT DEVICES

- A. The maximum exit device projection shall be a maximum of 3-1/16" when activated. The exit device bar shall have an average minimum thickness of .201". The pushpad surface shall be constructed of stainless steel; pushpads with plastic or Lexan coatings shall not be acceptable. Nylon bearings and stainless steel springs shall be used for long life and durability. Only torsion or compression springs are acceptable. Extension type springs are not acceptable. All device covers shall be of cast brass, deep drawn steel or stainless steel. Latchbolts shall be of stainless steel and shall have a deadlocking latch for extra security, except at full-glass or two-light glass doors requiring narrow stile device. Mounting screws shall be concealed to deter tampering. All ferrous parts shall be zinc coated to prevent rusting.
- B. Single point, one quarter turn hex dogging shall be standard on panic listed devices. Optional key cylinder dogging shall be available, and furnished if so indicated in the hardware sets, on panic listed devices. Devices with hex key dogging shall be easily field converted to cylinder dogging.
- C. All devices shall be listed by Underwriters Laboratories for safety as panic hardware. Fire rated devices shall be UL listed for A label and lesser class doors, 4' x 8' single and 8' x 8' pair. The model number shall be located on the end cap; devices having the model number located other than on the end cap shall not be acceptable.

- D. All exit devices shall have a unitized installation feature and may be cut in the field to size. Devices shall be closed on all sides with no pinch points. The pushpad shall be designed to prevent pinching of the fingers when depressed.
- E. Exit Device trim to be throughbolted. Lever trim to be heavy duty forged escutcheon with free wheeling levers.
- F. All exit devices shall conform to Federal Specification FF-H-1820, and be certified as meeting ANSI A156.3, Grade 1 requirements.
- G. Acceptable and Approved: **No Substitutions**
Von Duprin

2.06 DOOR CLOSERS

- A. Closers shall be rack and pinion construction. They shall be non-sized with adjustable spring power. Closing the door shall be controlled by two valves, one to control closing and one to control latching speed. Closers shall be regularly furnished with fully adjustable backcheck and a backcheck selector valve allowing approximate 70 degree backcheck on both regular and parallel arm closers. Delayed action shall be available. Valves shall be concealed against unauthorized adjustment and be non-critical needle valve type. Closers shall be mounted out of line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out swing doors. Mount closers top jamb or on brackets and/or drop plates where special conditions exist. Include cost for any required special templates.
- B. Closers shall be certified as meeting the ANSI A156.4, Grade 1 requirements and be listed by Underwriters Laboratories for all classes of labeled doors.
- C. Door Closers shall be furnished on all labeled doors.
- D. Acceptable and Approved: **No Substitutions**
LCN

2.07 OVERHEAD STOPS AND HOLDERS

- A. Furnish overhead stops or holders of the weight, functions and materials indicated in the hardware sets.
- B. Overhead stops or holders shall be manufactured entirely of metallic components. Units containing plastic, nylon, or similar materials are not acceptable.

- C. Acceptable and Approved as follows:

ABH Manufacturing
Glynn Johnson

2.08 TRIM/KICK PLATES/DOOR STOPS

- A. All door protection plates to be manufactured of .050" stainless steel. Protection plates to be furnished 2" less than door width on single doors and 1" less than door width on pairs of doors.
- B. Wall mounted door stops shall be provided where door leaves will strike a wall at the end of their opening cycle. If other conditions exist, furnish floor stops or overhead stops as required.
- C. Acceptable and Approved as follows:

Trimco/Quality
Baldwin
Ives

2.09 WEATHERSTRIP/THRESHOLDS/SMOKE SEALS

- A. Provide weatherstrip, thresholds, and/or sound seals for each opening as scheduled. Review Sill detail on Architectural drawings and furnish threshold type required.
- B. Provide smoke seal (including meeting stile seal for door pairs) for all fire rated doors. All smoke seal and astragals shall be listed by either Underwriters Laboratory or Warnock-Hersey as Category "H" – Smoke and Draft Control Gasket under the testing protocols of UBC Standard 7-2 – 1997, Part 2 and/or UL1784. All smoke seal and astragals shall, additionally, comply with the door manufacturer's listing under the same protocols.
- C. Acceptable and Approved as follows:

National Guard
Pemko
Zero

PART 3 - EXECUTION

3.01 INSTALLATION

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- A. Mount hardware units at heights indicated in "Recommended Locations for Builders Hardware" for (Standard Steel Doors and Frames) by the Door and Hardware Institute (DHI), except if otherwise specifically indicated or to comply with requirements of governing regulations, requirements for the handicapped, or if otherwise directed by the Architect.
- B. All hardware shall be installed by a tradesman skilled in the application of commercial grade hardware.
- C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Securely fasten all parts to be attached. Fit faces of mortise parts snug and flush. Make sure all operating parts move freely and smoothly without binding, sticking or excessive clearance. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, the hardware shall be removed and stored prior to the painting or finishing. Items shall then be reinstalled only when the finished have been completed on the surface to which the hardware is to be applied.
- D. At exterior doors and elsewhere as indicated, set thresholds in a bed of sealant as specified in Section 07900 to completely fill concealed voids and excluded moisture from every source. Do not plug drain hole or block weeps. Remove excess sealant.
- E. After installation, representative templates, instruction sheets and installation details shall be placed in a file folder to be turned over to the Owner when building is accepted. Included shall be at least five (5) each of any special adjusting and/or installation tools furnished with the hardware by the manufacturers.

PART 4 - SCHEDULES

4.01 HARDWARE SETS

Hardware Group No. 001

For use on mark/door #(s):

100 100A 204

Provide each PR door(s) with the following:

DOOR HARDWARE
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CHEROKEE HARD ROCK CASINO 4

NOTE

HARDWARE BY DOOR
MANUFACTURER

Hardware Group No. 101

For use on mark/door #(s):
216

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|-------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | OFFICE/ENTRY LOCK | L9050T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 103

For use on mark/door #(s):
214

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|-------------------|--|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | OFFICE/ENTRY LOCK | L9050T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 201

For use on mark/door #(s):

| | | | | | |
|------|------|-----|-----|-----|-----|
| 108 | 108A | 112 | 114 | 122 | 124 |
| 130 | 130A | 133 | 136 | 137 | 138 |
| 150 | 151 | 205 | 206 | 207 | 212 |
| 212A | 215 | 219 | | | |

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|----------------|----------------|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06A | 626 | SCH |

DOOR HARDWARE

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| | | | | | |
|---|----|------------------|---|-----|-----|
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 201C

For use on mark/door #(s):

102A 113A

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 201W

For use on mark/door #(s):

113

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1 5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 207

For use on mark/door #(s):

104 115 117 133A 145 202
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CHEROKEE HARD ROCK CASINO 4

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | OH STOP | 900S SERIES X SIZE & MOUNTING AS REQ | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON-RATED DOORS) | BK | ZER |

Hardware Group No. 212SW

For use on mark/door #(s):

149 149A

Provide each PR door(s) with the following:

| | | | | | |
|---|----|-------------------|--|-----|-----|
| 6 | EA | HINGE | 5BB1 5 X 4.5 | 652 | IVE |
| 2 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | DUST PROOF STRIKE | DP2 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | L9080T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | OH STOP | 900S SERIES X SIZE & MOUNTING AS REQ | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON-RATED DOORS) | BK | ZER |

Hardware Group No. 301

For use on mark/door #(s):

148

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY LOCK | L9040 06A | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON-RATED DOORS) | BK | ZER |

DOOR HARDWARE

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CHEROKEE HARD ROCK CASINO 4

Hardware Group No. 401H

For use on mark/door #(s):
200

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PASSAGE SET | L9010 06A | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP/HOLDER | WS40 | 626 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 501

For use on mark/door #(s):
126A 127 147

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. 507

For use on mark/door #(s):
102

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|----------------|-----------------------|-----|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | L9070T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |

CHEROKEE HARD ROCK CASINO 4

| | | | | | |
|---|----|------------------|--|-----|-----|
| 1 | EA | OH STOP | 900S SERIES X SIZE & MOUNTING AS REQ | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON-RATED DOORS) | BK | ZER |

Hardware Group No. 700

For use on mark/door #(s):

| | | | | | |
|------|------|------|------|-----|------|
| 103C | 103D | 103E | 103F | 120 | 120A |
| 135 | 143 | 144 | 153 | | |

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | 9949/50-L-06 (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 2 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. 700C

For use on mark/door #(s):

| | |
|-----|-----|
| 152 | 154 |
|-----|-----|

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | 9949/50-L-06 (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 2 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. 700H

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For use on mark/door #(s):

204A

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | 9949/50-L-06 (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 2 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP/HOLDER | WS40 | 626 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. 700S3

For use on mark/door #(s):

153A

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | 9949/50-L-06 (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 2 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | OH STOP | 900S SERIES X SIZE & MOUNTING AS REQ | 630 | GLY |
| 2 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. 701

For use on mark/door #(s):

134 146 218

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|----------------|--|-----|-----|
| 1 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | PANIC HARDWARE | 99-L-06 LENGTH AS REQ | 626 | VON |
| 1 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |

DOOR HARDWARE

Project No: H17018

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| | | | | | |
|---|----|------------------|------------------------|-----|-----|
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. 710R

For use on mark/door #(s):
156

Provide each PR door(s) with the following:

| | | | | | |
|---|----|--------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | FIRE EXIT HARDWARE | 9949/50-EO-F- (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 1 | EA | FIRE EXIT HARDWARE | 9949/50-NL-F- (WDC @ WD) LENGTH & HEIGHT AS REQ | 626 | VON |
| 1 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | ASTRAGAL | 328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED | AL | ZER |
| 1 | EA | GASKETING | 188S H & J | BK | ZER |

Hardware Group No. 714

For use on mark/door #(s):

| | | | | | |
|------|------|------|------|------|------|
| 118 | 118A | 134A | 135C | 135D | 143A |
| 144A | 155 | | | | |

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | PANIC HARDWARE | 9949/50-EO LENGTH & HEIGHT AS REQ | 626 | VON |
| 1 | EA | PANIC HARDWARE | 9949/50-NL LENGTH & HEIGHT AS REQ | 626 | VON |
| 1 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142A DW + 4" | AA | ZER |
| 1 | EA | GASKETING | 328AA H & J | AA | ZER |
| 1 | EA | ASTRAGAL | 328AA (2 PCS - 1 SET) HEIGHT AS REQUIRED | AL | ZER |
| 2 | EA | DOOR SWEEP | 8198AA LENGTH AS REQ | AA | ZER |
| 1 | EA | THRESHOLD | 65A LENGTH AS REQ | A | ZER |

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Hardware Group No. 800AV

For use on mark/door #(s):

118B 118C

Provide each PR door(s) with the following:

| | | | | | |
|---|-----|--------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | DUMMY PUSH BAR | 330 LENGTH AS REQ | 626 | VON |
| 2 | EA | 90 DEG OFFSET PULL | 8190-O 10" | 630 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP SCUSH X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | SET | SEAL | PERIMETER SEAL BY FRAME MANUFACTURER | | |
| 1 | SET | ASTRAGAL | MEETING STILE SEAL BY DOOR MANUFACTURER | | |

Hardware Group No. 801

For use on mark/door #(s):

140 141

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|------------------|---|-----|-----|
| 1 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | PULL PLATE | 8303 10" 4" X 16" | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. B700CH

For use on mark/door #(s):

103 103A 103B

Provide each PR door(s) with the following:

| | | | | | |
|---|----|------------------|------------------------------|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | 3349A-L-06 LENGTH AS REQ | 626 | VON |
| 2 | EA | MORTISE CYLINDER | 20-059 TYPE AS REQ | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 ICX CONSTRUCTION CORE | 622 | SCH |

DOOR HARDWARE

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CHEROKEE HARD ROCK CASINO 4

| | | | | | |
|---|----|------------------|---|-----|-----|
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP SHCUSH X MTG BRKT, SPACER & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. W401HW

For use on mark/door #(s):

106 109 128 131

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|---------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1HW 5 X 4.5 | 652 | IVE |
| 1 | EA | MULT PT PASSAGE SET | LM9310 06A | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP/HOLDER | WS40 | 626 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. W501

For use on mark/door #(s):

126

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|-------------------|---|-----|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | MULT PT CLASSROOM | LM9370T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON- RATED DOORS) | BK | ZER |

Hardware Group No. W507

For use on mark/door #(s):

142

Provide each SGL door(s) with the following:

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CHEROKEE HARD ROCK CASINO 4

| | | | | | |
|---|----|-------------------|--|-----|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | MULT PT CLASSROOM | LM9370T 06A | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | OH STOP | 900S SERIES X SIZE & MOUNTING AS REQ | 630 | GLY |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 188S H & J (USE SILENCERS @ NON-RATED DOORS) | BK | ZER |

Hardware Group No. W700H

For use on mark/door #(s):
139

Provide each PR door(s) with the following:

| | | | | | |
|---|----|---------------------|--|-----|-----|
| 2 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 2 | EA | PANIC HARDWARE | WS-9927-L-06 LENGTH AS REQ | 626 | VON |
| 1 | EA | ROD AND LATCH GUARD | RG-27- | 630 | VON |
| 2 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 2 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 2 | EA | PROTECTION PLATE | 8400 10" X 1" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP/HOLDER | WS40 | 626 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

Hardware Group No. W701H

For use on mark/door #(s):
139A

Provide each SGL door(s) with the following:

| | | | | | |
|---|----|---------------------|--|-----|-----|
| 1 | EA | CONT. HINGE | 112HD | 628 | IVE |
| 1 | EA | PANIC HARDWARE | WS-9927-L-06 LENGTH AS REQ | 626 | VON |
| 1 | EA | ROD AND LATCH GUARD | RG-27- | 630 | VON |
| 1 | EA | RIM HOUSING | 20-079 | 626 | SCH |
| 1 | EA | FSIC CORE | 23-030 PERMANENT CORE | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP OR P4040XP X MTG BRKT, SPCR & PLATE AS REQ X ST3596 | 689 | LCN |
| 1 | EA | PROTECTION PLATE | 8400 10" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP/HOLDER | WS40 | 626 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

DOOR HARDWARE

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END OF SECTION

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1. Windows.
 - 2. Doors.
 - 3. Glazed entrances.
 - 4. Interior borrowed lites.
 - 5. Glazed aluminum curtain wall framing.

1.3 DEFINITIONS:

- A. **Manufacturer:** A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. **Interspace:** Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. **Deterioration of Coated Glass:** Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.
- D. **Deterioration of Insulating Glass:** Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for 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.
- E. **Deterioration of Laminated Glass:** Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1.4 PERFORMANCE REQUIREMENTS:

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade indicated on Drawings.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
 - 1) For monolithic-glass lites heat treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - d. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.

- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.

2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- wide interspace.
4. Center-of-Glass Values: Based on using LBL-44789 WINDOW 5.0 computer program for the following methodologies:
 - a. U-Factors: NFRC 100 expressed as Btu/ sq. ft. x h x deg F(W/sq. m x K).
 - b. Solar Heat Gain Coefficient: NFRC 200.
 - c. Solar Optical Properties: NFRC 300.

1.5 SUBMITTALS:

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- square Samples for glass.
 1. Coated vision glass.
 2. Fire-rated glass.
 3. Coated spandrel glass.
 4. Insulating glass for each designation indicated.
 5. For each color (except black) of exposed glazing sealant indicated.
- C. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- D. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- E. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- F. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.
- G. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
 1. Coated float glass.
 2. Insulating glass.
 3. Coated spandrel glass.
 4. Glazing sealants.
 5. Glazing gaskets.
- H. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.

I. Warranties: Special warranties specified in this Section.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.
- C. Source Limitations for Coated Glass: Obtain coated glass from one manufacturer for each type of coating and each type and class of float glass indicated.
- D. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
- E. Source Limitations for Laminated Glass: Obtain laminated-glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
- F. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- G. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.
 - 1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - a. Perform tests under normal environmental conditions replicating those that will exist during installation.
 - 2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 - 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- H. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

- I. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

- J. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
 - 1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 - 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft.(0.84 sq. m) in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft.(0.84 sq. m) or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.

- K. 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" and "Laminated Glass Design Guide."
 - 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines."

- L. Mockups: Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:
 - a. Fully tempered glass.
 - b. Coated insulating glass.
 - c. Laminated glass.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 - 3. Obtain Architect's approval of mockups before starting fabrication.
 - 4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 5. Demolish and remove mockups when directed.
 - 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- M. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings."

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

1.8 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F.

1.9 WARRANTY:

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
 - a. Spandrel Glass: 5 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - 1. Warranty Period: 5 years from date of Substantial Completion.
- C. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products indicated in schedules at the end of Part 3.

2.2 PRIMARY FLOAT GLASS:

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.3 HEAT-TREATED FLOAT GLASS:

- A. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent flat glass); Quality-Q3; of class, 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. Provide Kind HS (heat-strengthened) float glass in place of annealed float glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in Part 1 "Performance Requirements" Article.
 - 3. For uncoated glass, comply with requirements for Condition A.
 - 4. For coated vision glass, comply with requirements for Condition C (other uncoated glass).
 - 5. Provide Kind FT (fully tempered) float glass in place of annealed or Kind HS (heat-strengthened) float glass where safety glass is indicated.

2.4 COATED FLOAT GLASS:

- A. General: Provide coated glass complying with requirements indicated in this Article and in schedules at the end of Part 3.
 - 1. Provide Kind HS (heat-strengthened) coated float glass in place of coated annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
 - 2. Provide Kind HS (heat-strengthened) coated float glass, except provide Kind FT (fully tempered) products where coated safety glass is indicated.
- B. Pyrolytic-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide coating applied by pyrolytic deposition process during initial manufacture, and complying with other requirements specified.

- C. Sputter-Coated Float Glass: Float glass with metallic-oxide or metallic-nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules at the end of Part 3.
- D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
 - 1. Fallout Resistance: Provide spandrel units identical to those passing the fallout-resistance test for spandrel glass specified in ASTM C 1048.

2.5 LAMINATED GLASS:

- A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.
- B. Interlayer: Interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - 1. Interlayer Material: Polyvinyl butyral sheets.
- C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
 - 1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.6 INSULATING GLASS:

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.
 - 1. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites and to comply with glass design requirements specified in "Performance Requirements" Article. Provide Kind FT (fully tempered) where safety glass is indicated.
- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - 1. Manufacturer's standard sealants.
 - 2. Color: Gray.

- D. Spacer Specifications: Manufacturer's standard spacer material and construction.
1. Corner Construction: Manufacturer's standard corner construction.
 2. Color: Gray.

2.7 FIRE-RATED, SAFETY GLAZING PRODUCTS: Provide one of the following:

- A. Laminated Ceramic Glazing Material: Proprietary Category II safety glazing product in the form of 2 lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch(8-mm) nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft.(19.5 kg/sq. m); and as follows:
1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Polished on both surfaces, transparent.
 3. Product: "FireLite Plus" by Nippon Electric Glass Co., Ltd., and distributed by Technical Glass Products.
- B. Specially Tempered Gel Insulated Glass: Proprietary Category II safety glazing product in the form of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass separated with gel filling, and as follows:
1. Fire-Protection Rating:: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Product: Subject to compliance with requirements, "SuperLite II-XL" by SAFTI; a Division of O'Keeffe's Inc.
- C. Laminated Glass with Intumescent Interlayers: Proprietary Category II safety glazing product in the form of multiple lites of Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Kind FT (fully tempered) float glass laminated with intumescent interlayers; and as follows:
1. Fire-Protection Rating: As indicated for the assembly in which glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Product: Subject to compliance with requirements, "PyroStop" by Pilkington Building Products North America and distributed by Technical Glass Products.

2.8 ELASTOMERIC GLAZING SEALANTS:

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select 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. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant in the Glazing Sealant Schedule at the end of Part 3, including those referencing ASTM C 920 classifications for type, grade, class, and uses.
1. Additional Movement Capability: Where additional movement capability is specified in the Glazing Sealant Schedule, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.

2.9 GLAZING TAPES:

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.

2.10 GLAZING GASKETS:

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.

2.11 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 A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

2.12 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS:

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, 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.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine framing glazing, 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 system.
 - 3. Minimum required face or 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.

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. Glazing channel dimensions, as indicated on Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass 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 sealant-substrate 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 the length plus width is larger than 50 inches as follows:
 - 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.

3.4 TAPE GLAZING:

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY):

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance 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. 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. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET):

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 LOCK-STRIP GASKET GLAZING:

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.8 PROTECTION AND CLEANING:

- 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, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

- E. Wash glass on both 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 by glass manufacturer.

3.9 MONOLITHIC FLOAT-GLASS SCHEDULE:

- A. Uncoated Clear Float-Glass Units “**SG-1**”: Class 1 (clear) float glass.
 - 1. Thickness: 6.0 mm.
- B. Uncoated Clear Float-Glass Units “**TG**”: Class 1 (clear) Kind FT (fully tempered) float glass.
 - 1. Thickness: 6.0 mm.
 - 2. Provide safety glazing labeling.

3.10 FIRE-PROTECTION-RATED SAFETY GLASS SCHEDULE:

- A. Fire Rated Safety Glass Units “**FRG**”: Fire-rated glazing with hose-stream test; monolithic ceramic glazing, laminated ceramic glazing or gel-filled, double glazing units.
 - 1. Thickness: As standard with manufacturer.
 - 2. Provide safety glazing labeling.
 - 3. Fire Rating: Match U.L fire rating listed in “Door and Hardware Schedule”.

3.11 INSULATING-GLASS SCHEDULE:

- A. Insulating Glass Units “**IG-1**”: All new exterior aluminum windows, aluminum curtain wall.
 - 1. Classification of Units: Class CBA.
 - 2. Air Space Width: Nominal ½ inch measured perpendicularly from surfaces of glass lites at unit's edge.
 - 3. Sealing System: Dual seal, primary and secondary sealants: manufacturer's standard sealants.
 - 4. Spacer Specifications: Manufacturer's standard metal.
 - a. Desiccant: Either molecular sieve or silica gel or blend of both.
 - b. Corner Construction: Manufacturer's standard corner construction.
 - c. Color of Spacer: Color as selected by Architect from manufacturer's standard colors.
 - 5. Glass Specifications: Comply with the following requirements:
 - a. Thickness of Each Lite: 6.0 mm.
 - b. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - c. Interspace Content: Argon.
 - d. Outdoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - e. Low-Emissivity Coating: Vacuum deposition sputtered coating on second surface.
 - f. Nominal Performance Characteristics are as indicated below:
 - 1) Visible Light Transmittance: 64 percent.

- 2) Visible Light Reflectance Exterior: 12 percent.
 - 3) Winter Nighttime U-Value: 0.24
 - 4) Solar Heat Gain Coefficient: 0.27
 - 5) Light to Solar Gain: 2.37
6. Product: Solarban 70XL; Vitro Architectural Glass, or accepted equal from one of the following manufacturers subject to compliance with requirements.
- a. Guardian Industries.
 - b. Viracon.
- B. Insulating Glass Units “**TIG-1**”: All new exterior aluminum curtain wall where safety glazing is required.
1. Classification of Units: Class CBA.
 2. Air Space Width: Nominal ½ inch measured perpendicularly from surfaces of glass lites at unit's edge.
 3. Sealing System: Dual seal, primary and secondary sealants: manufacturer's standard sealants.
 4. Spacer Specifications: Manufacturer's standard metal.
 - a. Desiccant: Either molecular sieve or silica gel or blend of both.
 - b. Corner Construction: Manufacturer's standard corner construction.
 - c. Color of Spacer: Color as selected by Architect from manufacturer's standard colors.
 5. Glass Specifications: Comply with the following requirements:
 - a. Thickness of Each Lite: 6.0 mm.
 - b. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - 1) Kind FT (fully tempered).
 - c. Interspace Content: Argon.
 - d. Outdoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - 1) Kind FT (fully tempered).
 - e. Low-Emissivity Coating: Vacuum deposition sputtered coating on second surface.
 - f. Nominal Performance Characteristics are as indicated below:
 - 1) Visible Light Transmittance: 64 percent.
 - 2) Visible Light Reflectance Exterior: 12 percent.
 - 3) Winter Nighttime U-Value: 0.24
 - 4) Solar Heat Gain Coefficient: 0.27
 - 5) Light to Solar Gain: 2.37
 6. Provide safety glazing labeling.
 7. Product: Solarban 70XL; Vitro Architectural Glass, or accepted equal from one of the following manufacturers subject to compliance with requirements.

- a. Guardian Industries.
 - b. Viracon.
- C. Insulating Glass Units “**TIG-2**”: Doors #103H, 130J, where safety glazing is required.
- 1. Classification of Units: Class CBA.
 - 2. Air Space Width: Nominal ½ inch measured perpendicularly from surfaces of glass lites at unit's edge.
 - 3. Sealing System: Dual seal, primary and secondary sealants: manufacturer's standard sealants.
 - 4. Spacer Specifications: Manufacturer's standard metal.
 - a. Desiccant: Either molecular sieve or silica gel or blend of both.
 - b. Corner Construction: Manufacturer's standard corner construction.
 - c. Color of Spacer: Color as selected by Architect from manufacturer's standard colors.
 - 5. Glass Specifications: Comply with the following requirements:
 - a. Thickness of Each Lite: 6.0 mm.
 - b. Indoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - 1) Kind FT (fully tempered).
 - c. Interspace Content: Argon.
 - d. Outdoor Lite: Tinted float glass.
 - 1) Kind FT (fully tempered).
 - 2) **GRAYLITE II, Vitro Architectural Glass.**
 - e. Low-Emissivity Coating: Vacuum deposition sputtered coating on second surface.
 - f. Nominal Performance Characteristics are as indicated below:
 - 1) Visible Light Transmittance: 6 percent.
 - 2) Visible Light Reflectance Exterior: 4 percent.
 - 3) Winter Nighttime U-Value: 0.24
 - 4) Shading Coefficient: 0.11.
 - 5) Light to Solar Gain: 0.55
 - 6. Provide safety glazing labeling.
 - 7. Product: Solarban 70XL; Vitro Architectural Glass, or accepted equal from one of the following manufacturers subject to compliance with requirements.
 - a. Guardian Industries.
 - b. Viracon.

3.12 ELASTOMERIC GLAZING SEALANT:

- A. Base Polymer: Neutral-curing silicone.

- B. Type: M (multicomponent).
- C. Grade: NS (nonsag).
- D. Class: 25.
- E. Additional Movement Capability: 25 percent movement in extension and 25 percent in compression for a total of 50 percent movement.
- F. Use Related to Exposure: NT (nontraffic).
- G. Uses Related to Glazing Substrates: G, A, and, as applicable to glazing substrates indicated, O.
 - 1. Use O Glazing Substrates: Elastomeric glazing gaskets and glazing accessories.
- H. Acceptable Manufacturers:
 - 1. Dow Corning Corporation.
 - 2. General Electric Co., div. of GE Silicones.
 - 3. Pecora Corporation.
 - 4. Sonneborn Building Products Division, ChemRex, Inc.

END OF SECTION 088000

SECTION 088113DECORATIVE GLASS GLAZINGPART 1 - GENERAL1.1 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. Patterned glass.
- B. Related Sections include the following:
 - 1. Section 090001 "Schedule of Finishes."

1.3 DEFINITION

- A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C 1036.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For decorative glass. Show fabrication and installation details. Include the following:
 - 1. Size and location of penetrations.
 - 2. Glazing method.
 - 3. Mounting method.
 - 4. Attachments to other work.
 - 5. Full-size details of edge-finished profiles.

- C. Glass Samples: For the following products, 12 inches (300 mm) square:
 - 1. Each type of decorative glass.
 - 2. Each edge treatment on type of decorative glass.
 - 3. Each decorative film overlay on type of decorative glass.
 - 4. Each applied coating on type of decorative glass.
- D. Glazing Accessory Samples: For sealants, in 12-inch (300-mm) lengths.
- E. Decorative Glazing Schedule: List decorative glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For decorative 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.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of decorative glass.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranty: For special warranty.

1.8 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of decorative glass to include in maintenance manuals.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under NGA's Certified Glass Installer Program.
- B. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.10 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass type, sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

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 enough 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.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect decorative glass and 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. Retain packaging and sequencing numbers for decorative-glass units.

1.12 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install decorative glass until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

1.13 WARRANTY

- A. Special Warranty on Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain each type of decorative glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer, for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed glazing systems shall withstand normal thermal movement and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; deterioration of glazing materials; or other defects in construction.

- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design decorative glass.
- C. Structural Performance: Decorative glass installed adjacent to walking surfaces shall withstand the following design loads within limits and under conditions indicated:
 - 1. Differential deflection of adjacent unsupported edges shall not exceed glass thickness when subjected to 50 lbf/ft. (730 N/m) applied horizontally to one panel at any point up to 42 inches (1067 mm) above the adjacent walking surface.
 - 2. Base design on thickness at thinnest part of the glass.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and "GANA's "Glazing Manual" unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
- D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with requirements indicated. Where heat-strengthened glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with requirements indicated. Where fully tempered glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear) or Class 2 (tinted) as indicated, Form 3; finish, pattern, and quality as indicated.
- B. Decorative Glazing Schedule: Section 090001 "Schedule of Finishes."

2.5 GLAZING MATERIALS

- A. Glazing Sealants, Tapes, and Miscellaneous Glazing Materials: As specified in Section 088000 "Glazing."
 - 1. Colors: As selected by Architect from manufacturer's full range.

2.6 HARDWARE FOR GLASS INSTALLATION

- A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.

- C. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- D. Gaskets: Manufacturer's standard, compatible with decorative glass type indicated.
- E. Anchors and Inserts: Provide devices as required for hardware installation. Provide metal expansion-bolt devices for drilled-in-place anchors. Provide stainless-steel anchors and inserts for applications on inside face of exterior walls and where indicated.

2.7 DECORATIVE-GLASS FABRICATION

- A. Fabricate decorative glass and provide other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with product manufacturer's written instructions and with referenced glazing standard.
- B. Edge Finishing: Finish edges smooth and polished, without chips, scratches, or warps.
 - 1. Finished Edge: Flat polished.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine decorative-glass framing members, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Minimum required face or edge clearances.
 - 3. Effective sealing between joints of decorative-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 orientation of outer surfaces as indicated on Drawings. Label or mark units as needed so that surface orientation is readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 INSTALLATION

- A. Set decorative-glass units in each series true in line with uniform orientation, pattern, draw, bow, and similar characteristics.
- B. Set glass lites with proper orientation so that each outer surface faces the direction indicated on Drawings.
- C. Set decorative glass in locations indicated on Drawings. Install glass with hardware and accessories according to hardware manufacturer's written instructions. Attach hardware securely to mounting surfaces and building structure.

- D. Set decorative glass in locations indicated on Drawings.

3.4 GLAZING, GENERAL

- A. Decorative Glass: Install glazing as specified in Section 088000 "Glazing."
- B. Comply with combined written instructions of manufacturers of glass, gaskets, sealants, tapes, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publications.
- 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 more than 50 inches (1270 mm).
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances, and to comply with system performance requirements.
 - 2. Provide 1/8-inch- (3-mm-) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.5 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants smooth.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.

- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces 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 088113

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Decorative plastic glazing.
- B. Related Sections include the following:
 - 1. Division 8 Section "Glazing" for glass and related glazing materials.
 - 2. Section 090001 "Schedule of Finishes."

1.3 SYSTEM DESCRIPTION:

- A. Provide plastic glazing sheets and glazing materials capable of withstanding normal temperature changes, wind loading, and impact loading without failure, including loss or breakage of plastic sheets attributable to the following: failure of sealants or gaskets to remain watertight and airtight, deterioration of plastic sheet and glazing materials, or other defects in materials and installation.

1.4 SUBMITTALS:

- A. Product Data: For each type of plastic sheet and glazing material specified.
- B. Shop Drawings: For each type of plastic glazing installation indicated. Show details of fabrication and installation.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of sections of plastic sheets and exposed glazing materials showing the full range of colors and finishes available for each type of plastic sheet and exposed glazing material indicated.
- D. Samples for Verification: Of each color and finish of plastic sheet specified, prepared on samples 12 inches (300 mm) square and of same thickness and material indicated for final Work.
 - 1. Include 12-inch- (300-mm-) long samples of each color of exposed glazing material selected or indicated. Install glazing material sample along with plastic sheet sample between 2 strips of material representative of adjoining framing system in color.
- E. Material Test Reports: Indicate and interpret test results for compliance of plastic glazing with requirements indicated.
- F. Material Certificates: Certificates signed by manufacturers certifying that each plastic glazing sheet item complies with requirements.

- G. Compatibility and Adhesion Test Reports: From sealant manufacturer indicating that plastic sheet and glazing materials have been tested for compatibility and adhesion with glazing sealants and glazing channel substrates; include sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- H. Research/Evaluation Reports: Evidence of plastic glazing's compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
- I. Maintenance Data: For plastic sheet materials to include in maintenance manuals specified in Division 1.

1.5 QUALITY ASSURANCE:

- A. Source Limitations: Obtain plastic glazing materials through one source from a single manufacturer for each type of plastic glazing and glazing product indicated.
- B. Glazing Publication: Comply with published recommendations of GANA's "Glazing Manual," unless more stringent requirements are indicated. Refer to this publication for definitions of glazing terms not otherwise defined in this Section or other referenced standards.
- C. Sustainable Building Performance Requirements:
 - 1. Adhesives, sealants, paints or coatings used for work in this Section for interior applications shall meet the requirements of Division 1 Section Volatile Organic Compound (VOC) "Limits for Adhesives and Sealants," where applicable.
 - 2. Materials manufactured within a radius of 500 miles from the project site where all or a portion of the raw resources also originate within a radius of 500 miles shall be documented in accordance with the Sustainable Building Submittal Requirements of this Section.
 - 3. Materials that contain recycled content shall be documented in accordance with the Sustainable Building Submittal Requirements of this Section.
- D. Preconstruction Compatibility and Adhesion Testing: Submit to glazing sealant manufacturers samples of materials that will contact or affect glazing sealants for testing indicated below.
 - 1. Use manufacturer's standard test methods to determine whether priming or other specific glazing channel preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glazing channel substrates.
 - a. Perform tests under normal environmental conditions that will exist during installation.
 - 2. Submit not fewer than 9 pieces of each type of material, including materials forming glazing channel substrates, each type and form of plastic sheet, gaskets, glazing tape, setting blocks, spacers shims, glazing sealant backings, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain glazing sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
- E. Fire-Test-Response Characteristics: Provide plastic sheets identical to those tested for the following fire-test-response characteristics per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify plastic sheets with appropriate markings of applicable testing and inspecting agency.
 - 1. Self-Ignition Temperature: 650 deg F (343 deg C) or more when tested per ASTM D 1929 on plastic sheets in thicknesses indicated for Work.
 - 2. Smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in thicknesses indicated for Work.
 - 3. Relative Burning Characteristics: As follows, when tested per ASTM D 635:

- a. Burning rate of 2.5 in./min. (1.06 mm/s) or less when tested on plastic glazing indicated below with a nominal thickness of 0.060 inch (1.5 mm) or thickness indicated for use.
 - 1) Monolithic acrylic plastic glazing.
- F. Mockups: Before installing plastic sheets, construct mockups for each form of plastic sheet and glazing required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
 1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before proceeding with fabrication and installation of plastic glazing.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. When directed, demolish and remove mockups from Project site.
 - b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Comply with manufacturer's written instructions for shipping, storing, and handling plastic glazing sheets and for removing protective coverings after installation.
- B. Maintain protective coverings on sheets to avoid exposures to abrasive substances, excessive heat, and other sources of possible deterioration.

1.7 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not proceed with glazing sealants if ambient and substrate temperature conditions are outside the limits permitted by glazing sealant manufacturers or when glazing channel substrates are wet because of rain, frost, condensation, or other causes.
 1. Install liquid sealants at ambient and substrate temperature conditions above 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 1. Decorative Acrylic:
 - a. 3Form.
 - b. Adirondack Studios.
 - c. Envel Design Corporation.
 - d. Lumingraf.
 - e. Triton Chandelier, Inc.

2.2 GLAZING PLASTICS, GENERAL:

- A. Sizes: Fabricate plastic glazing sheets to sizes required. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with written instructions of plastic glazing manufacturer.
- B. Thicknesses: Provide thicknesses indicated or, if not otherwise indicated, as recommended by plastic glazing manufacturer for application indicated.

2.3 MONOLITHIC ACRYLIC GLAZING:

- A. Uncoated Monolithic Acrylic Sheet: ASTM D 4802, Type UVA (formulated with ultraviolet absorber), Finish 1 (smooth or polished), and as follows:
 - 1. Decorative Glazing Schedule:
 - a. **DA-(#):** See Section 090001 "Schedule of Finishes."

2.4 GLAZING SEALANTS:

- A. General: Provide manufacturer's standard products of type indicated and complying with the following requirements:
 - 1. Compatibility: Provide glazing sealants that are compatible with other materials with which they will come into contact, including plastic glazing products and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
 - 2. Suitability: Provide glazing sealants recommended in writing by sealant and glazing manufacturers for applications indicated, based on performance characteristics.
 - 3. Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect from manufacturer's full range of colors.
- B. One-Part, Neutral-Curing, Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, M, G, A, and, as applicable to joint substrates indicated, O; and with the additional capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the following percentage changes in joint width as measured at time of application and remain in compliance with other requirements of ASTM C 920 for uses indicated:
 - 1. 50 percent movement in both extension and compression for a total of 100 percent movement.
 - 2. 100 percent movement in extension and 50 percent movement in compression for a total of 150 percent movement.

2.5 GLAZING GASKETS:

- A. Dense Compression Gaskets: Extruded or molded, closed-cell gaskets of material indicated below, complying with ASTM standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
 - 1. Neoprene, per ASTM C 864.
 - 2. EPDM, per ASTM C 864.
 - 3. Silicone, per ASTM C 1115.
 - 4. Any material indicated above.

2.6 MISCELLANEOUS GLAZING MATERIALS:

- A. Compatibility: Provide materials with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Neoprene, EPDM, or silicone blocks as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.
- D. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5- to 10-psi (35- to 70-kPa) compression strength for 25 percent deflection.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine plastic glazing framing, with glazing Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Minimum required face or edge clearances.
 - 3. Effective sealing between joints of plastic glazing framing members.
- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Clean glazing channels and other framing members to receive plastic glazing immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.3 GLAZING, GENERAL:

- A. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publication.
- B. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.
- C. Remove burrs and other projections from glazing channel surfaces.
- D. Protect plastic surfaces from abrasion and other damage during handling and installation, according to the following requirements:
 - 1. Retain plastic glazing manufacturer's protective covering or protect by other methods according to plastic glazing manufacturer's written instructions.
 - 2. Remove covering at border of each piece before glazing; remove remainder of covering immediately after installation where plastic glazing will be exposed to sunlight or where other conditions make later removal difficult.

3. Remove damaged plastic glazing sheets from Project site and legally dispose of off-site. Damaged plastic glazing sheets are those containing imperfections that, when installed, result in weakened glazing and impaired performance and appearance.
- E. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- F. Install elastomeric setting blocks in sill channels, sized and located to comply with referenced glazing standard, unless otherwise instructed by plastic glazing manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- G. Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise instructed by plastic glazing manufacturer.
- H. 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.
- I. Square cut wedge-shaped gaskets at corners and install gaskets as recommended by gasket manufacturer to prevent corners from pulling away; seal corner and butt joints with sealant recommended by gasket manufacturer.

3.4 GASKET GLAZING (DRY):

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Secure compression gaskets in place with joints located at corners to compress gaskets, producing a weathertight seal without developing bending stresses in plastic glazing sheets. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Install gaskets so they protrude past face of glazing stops.

3.5 SEALANT GLAZING (WET):

- A. Install continuous spacers between plastic glazing lites and glazing stops to maintain plastic glazing face clearances and to prevent sealant from extruding into glazing channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to plastic glazing and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial washaway from plastic glazing. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

3.6 PROTECTION AND CLEANING:

- A. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash by method recommended by plastic glazing manufacturer.
- B. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.

- C. Wash plastic glazing on both faces before date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Wash plastic glazing by method recommended by plastic glazing manufacturer.

END OF SECTION 088400

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Installation of new window film.

1.3 DEFINITIONS:

- A. Deterioration of Window Film: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning window film contrary to manufacturer's written instructions. Defects include peeling, cracking, demetalization, delamination and other indications of deterioration in window film.

1.4 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include data on physical characteristics.
- B. Shop Drawings: Show location and extent of each window film.
- C. Samples for Verification: Full width by 36-inch-long section of window film to be used.
- D. Maintenance Data: For window films to include in maintenance manuals.

1.5 QUALITY ASSURANCE:

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate appearance and aesthetic effects and set quality standards for installation.
 - 1. Provide a mockup for each type of window film.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install window film until spaces are completed and painting is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY:

- A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by manufacturer, in which manufacturer agrees to replace window film that deteriorate as defined in "Definitions" Article, within warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 WINDOW FILM PRODUCTS:

- A. Window Film (**GF-1**):
 - 1. Products: Available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Decorative Films.
 - 1) #SXGF-0097, "Deep Etch," Solyx; Decorative Films.
 - 2. Performance Data:
 - a. Film Color: Translucent, colorless.
 - b. Simulates sandblasted glass.

2.2 ACCESSORIES:

- A. Adhesive: Manufactures adhesive that will not lose effectiveness or loosen over time.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair window film's bond, including mold, mildew, oil, grease, dirt, and dust.
- C. Prepare substrates to achieve a smooth, dry, clean, surface free of contaminates.

3.3 INSTALLATION:

- A. General: Comply with window film manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.

- B. Fully bond window film to glass substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 CLEANING:

- A. Remove excess adhesive at perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by window film manufacturer.
- C. Replace window film that cannot be cleaned.

END OF SECTION 088700

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. The drawings and general provisions of contract, including General and Supplementary Conditions, and Division 1 - General Requirements apply to this Section.




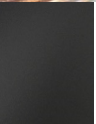




1.2 INCLUDED IN THIS SECTION:








- A. This schedule lists the typical and specific finishes required for spaces throughout the building.








1.3 SCHEDULE OF FINISHES:



- A. Begins on the next page.

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|---|-----------------|-----------------|--------------|---------------------------------|-----------------------------|---------------------------|---------------------------|
| | | DIVISION 3 - CONCRETE | | | | | | | |
| | | 033300 -Architectural Concrete | | | | | | | |
| 1/29/2018 |  | ARC-1 | BOMANITE | UN-COLORED | RUST RED | TO HAVE A CLEAR FINISH TOP COAT | SCOTT LYNCH 918.744.6272 | | ENTERTAINMENT VENUE |
| | | Sealed Concrete | | | | | | | |
| 4/18/2018 | | CS-1 | | | | SEALED CONCRETE EXPOSED | | | |
| | | 034900 - Glass Fiber Reinforced Cement | | | | | | | |
| | | GFRC-1 | | | | | | | |
| | | GFRC-2 | | | | | | | |
| | | GFRC-3 | | | | | | | |
| | | 035400 - Architectural Precast Concrete | | | | | | | |
| | | APC-1 | | | | | | | |
| | | APC-2 | | | | | | | |
| | | APC-3 | | | | | | | |
| | | DIVISION 4 - MASONRY | | | | | | | |
| | | 042000 - Brick Veneer | | | | | | | |
| 3/21/2018 | | B-1 | | | | | | | |
| | | B-2 | | | | | | | |
| | | 042000 - CMU | | | | | | | |
| | | CMU-1 | | | | | | | |
| | | CMU-2 | | | | | | | |
| | | 042000 - Structural Glazed Tile | | | | | | | |
| | | STGLT-1 | | | | | | | |
| | | 044313 - Adhered Stone Masonry Veneer | | | | | | | |
| 3/14/2018 |  | ASM-1 | STONE MILL INC. | WEATHERED BLEND | TUDOR | | | | Multipurpose Room Columns |
| | | 047200 - Cast Stone | | | | | | | |
| | | CS-1 | | | | | | | |
| | | CS-2 | | | | | | | |
| | | DIVISION 5 - METALS | | | | | | | |
| | | 057000 - Decorative Metals | | | | | | | |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--|---|--------|-----------------------------------|--------------------|------------------------------|----------------------------|---|---------------------------|--|
| 3/21/2018 |  | DM-1 | MOZ | BLENDS | PATINA 114 | (Copper) | MONICA WOODS 510.632.0853 monica@mozdesigns.com | | ENTERTAINMENT VENUE STANDING BAR BACK SPLASH |
| 2/19/2018 |  | DM-2 | GAGE ARCHITECTURAL PRODUCTS | GAGE METAL | GM4724 BLACK ORGANIC | | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | ENTERTAINMENT VENUE, CASINO, MULTI-USE SPACE, POKER, POKER MEZZANINE, DRINK RAIL |
| 3/21/2018 |  | DM-3 | MOZ | | CORRUGATED METAL SHEETS | FINISHED IN MOZ PATINA 168 | MONICA WOODS 510.632.0853 monica@mozdesigns.com | | ENTERTAINMENT VENUE AND CASINO BAR ROOFS |
| 3/22/2018 |  | DM-4 | | ALUMINUMHAND RAILS | ALUMINUM POWDER COATED BLACK | RAILINGS | | | ENTERTAINMENT VENUE/ENTERTAINM ET VENUE MEZZANINE, POKER MEZZANINE DRINK AND HAND RAILS |
| 3/21/2018 |  | DM-5 | MOZ | BLENDS | PATINA 110 | | MONICA WOODS 510.632.0853 monica@mozdesigns.com | | CASINO VIGNETTES |
| 4/9/2018 |  | DM-6 | Chemetal | Metawave | Bronze Aluminum | | | | Bar Back Panels |
| <u>DIVISION 6 - WOOD AND PLASTICS</u> | | | | | | | | | |
| 062000 - Simulated Wood Trim | | | | | | | | | |
| SWT-1 | | | | | | | | | |
| SWT-2 | | | | | | | | | |
| SWT-3 | | | | | | | | | |
| 064023 - Decorative Hardware | | | | | | | | | |
| DH-1 | | | | | | | | | |
| DH-2 | | | | | | | | | |
| 064023 - Metal Laminate | | | | | | | | | |
| ML-1 | | | | | | | | | |
| ML-2 | | | | | | | | | |
| ML-3 | | | | | | | | | |
| ML-4 | | | | | | | | | |
| 064023 - Plastic Laminate | | | | | | | | | |
| 3/22/2018 |  | PL-1 | WILSONART | | CAFELLE / 7933K-07 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | TO BE USED IN WPN-1 |
| 3/22/2018 |  | PL-2 | WILSONART | | MONTANA WALNUT / 7110K-78 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | TO BE USED IN WPN-1 |



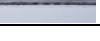


| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|---|---|--------|--------------|--------------------------|---------------------------------|--|---|---------------------------|---|
| 3/22/2018 |  | PL-3 | WILSONART | | FIGURED MAHOGANY / 7040K-78 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | TO BE USED IN WPN-1 |
| 3/22/2018 |  | PL-4 | WILSONART | | ASIAN SUN / 7951K-18 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | TO BE USED IN WPN-1 |
| 1/18/2018 |  | PL-5 | WILSONART | | ANTIQUE BOURBON PINE / 8215K-12 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | BAR/ENTRY/DANCE FLOOR/CASINO MILLWORK |
| 4/4/2018 |  | PL-6 | WILSONART | | NEOWALNUT / 7991-38 | TO MATCH WC-10, CONTROL SAMPLE FOR ST-4 | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | veneer (HM) DOORS |
| 4/10/2018 |  | PL-7 | WILSONART | | BOARDWALK OAK / 7983-38 | TO MATCH WC-8, CONTROL SAMPLE FOR ST-2 | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | POKER ROOM/LOUNGE |
| 4/10/2018 |  | PL-8 | WILSONART | | FLORENCE WALNUT / 7993-38 | TO MATCH WC-9, CONTROL SAMPLE FOR ST-3 | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | POKER ROOM/LOUNGE |
| 4/10/2018 |  | PL-9 | WILSONART | | Pasadena Oak / 7986-38 | TO MATCH WC-2, CONTROL SAMPLE FOR ST-1 | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | - |
| 4/17/2018 | | PL-10 | FORMICA | | BLACK, MATTE FINISH 909C-58 | | | | TRIMS |
| 064023 / 081213 - Wood Veneer and Solid Trim | | | | | | | | | |
| 4/10/2018 | | WD-1 | -- | Pine Clapboard | 8" Pine, Random Length | Stained to match ST-1 | | | Saloon Façade |
| 4/10/2018 | | WD-2 | -- | Beadboard Panel | 3/16"x 4' x 8' Panel | Stained to match ST-1 | | | Stage Front & Header |
| 4/10/2018 | | WD-3 | -- | 3/4" x 3" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-4 | -- | 3/4" x 4" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-5 | -- | 3/4" x 6" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-6 | -- | 3/4" x 12" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-7 | -- | 12" Crown Moulding | Oak/Poplar | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-8 | -- | 1 1/2" x 6" Deep Profile | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | Ent. Bar at Bar Mirror |
| 4/10/2018 | | WD-9 | -- | 3/4" x 3/4" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-10 | -- | 3/4" x 1 1/2" Flat Stock | Oak/Poplar, 1/8" Beveled Top | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/10/2018 | | WD-11 | -- | Quarter Wagon Wheel | Oak/Poplar | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/16/2018 | | WD-12 | -- | 3" x 3" Trim | Oak/Poplar | Stain per Elevations/Fin Sched | | | See Elevs & Sheets |
| 4/16/2018 | | WD-13 | -- | 3" x 3" Trim with Reveal | Oak/Poplar | Stain per Elevations/Fin Sched | 2" x 1/2" reveal for door frames | | See Elevs & Sheets |
| 064023 - Solid Surface | | | | | | | | | |






| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|--|------------------------|---------------|----------------------------|---------------------------------|---|---------------------------|--|
| 3/22/2018 | | SS-1 | WILSONART | QUARTZ | ISSELBURG Q4013 | | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | BOH RESTROOM COUNTERTOPS |
| 4/2/2018 |  | SS-2 | WILSONART | QUARTZ | ADASTRA Q3006 | COUNTERTOP AT DRINK STATIONS | Kelly Swaim ISC Surfaces kswaim@iscsurfaces.com 405-618-0393 | | CASINO DRINK STATIONS/MULTI- PURPOSE SPACE/CASINO MILLWORK/POKER ROOM |
| | | 064023 - Stain | | | | | | | |
| 4/12/2018 |  | ST-1 | | | | TO MATCH WC-2 | | | ENTERTAINMENT VENUE/MULTI PURPOSE ROOM/CASINO/MEZZ ANINE |
| 4/12/2018 |  | ST-2 | | | | TO MATCH WC-8 | | | POKER ROOM |
| 4/12/2018 |  | ST-3 | | | | TO MATCH WC-9 | | | POKER ROOM |
| 4/12/2018 |  | ST-4 | | | | TO MATCH WC-10 | | | POKER ROOM/MULTI- PURPOSE |
| | | 064213 - Wall Panel System | | | | | | | |
| | | WPN-1 | See Section 068000 | | | | | | |
| | | WPN-3 | | | | | | | |
| | | WPN-2 | | | | | | | |
| | | 066400 - FRP - Fiberglass Reinforced Plastic Wall Panels | | | | | | | |
| 1/30/2018 |  | FRP-1 | Crane Composites, Inc. | | Embossed Colonial White/83 | | 23525 W EAMES STREET CHANNANHON, IL 60410 815.467.8666 | | BACK OF HOUSE |
| 1/30/2018 |  | FRP-2 | Crane Composites, Inc. | | Embossed Block/1201 | | 23525 W EAMES STREET CHANNANHON, IL 60410 815.467.8666 | | BAR INTERIOR MILLWORK |









| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--|---|--------|------------------------|-------------------------------|---------------------------------|--|---|---------------------------|---|
| 4/20/2018 | | FRP-3 | Crane Composites, Inc. | | Tennessee Timber 003TT | | 23525 W EAMES STREET CHANNANHON, IL 60410 815.467.8666 | | CONCESSION STAND |
| 068000 - PCF Plastic Composite Fabrications | | | | | | | | | |
| 4/11/2018 |  | PCF-1 | KMDI INC. | FAUX BEAMS/TRUSSES | TBD | TRUSSES AND BEAMS; TO MATCH ST-4 | 400 FUNSTON RD. KANSAS CITY, KS 66115 800.474.5004 | | Multi-purpose ceiling beams |
| 3/22/2018 |  | WPN-1 | KMDI | REPURPOSED FAUX WOOD PANEL | | TO BE A MIXTURE OF STAINS. MAJORITY OF IT TO MATCH ST- 1 AND THE REST TO BE A MIXTURE OF PL-1, 2, 3 AND 4 | GAIL GRAUBERGER 913.306.0625 CELL 913.281.4200 OFFICE gail.grauberger@KMDI.net | | CASINO/ENTERTAINM ENT VENUE/MULTI- PURPOSE SPACE/MEZZANINE |
| 072413 - EIFS (Exterior Insulation Finish System) | | | | | | | | | |
| | | EIFS-1 | | | | | | | |
| | | EIFS-2 | | | | | | | |
| | | EIFS-3 | | | | | | | |
| | | EIFS-4 | | | | | | | |
| | | EIFS-5 | | | | | | | |
| 073415 - DEFS (Direct-Applied Exterior Finish System) | | | | | | | | | |
| | | DEFS-1 | | | | | | | |
| | | DEFS-2 | | | | | | | |
| | | DEFS-3 | | | | | | | |
| 074113 - Metal Roof Panels | | | | | | | | | |
| | | RP-1 | | | | | | | |
| | | RP-2 | | | | | | | |
| 074213 / 074243 - Metal Wall Panels | | | | | | | | | |
| | | WP-1 | | | | | | | |
| | | WP-2 | | | | | | | |
| 076100 - Roofing Specialties | | | | | | | | | |
| | | MC-1 | | | | | | | |
| | | MC-2 | | | | | | | |
| | | MC-3 | | | | | | | |
| 079500 - Expansion Joint Assemblies | | | | | | | | | |
| 4/12/2018 | | EJ-01 | Jointmaster | 516-A01-100 | 4" joint width, 2" frame height | | | | Floor to Floor Assembly |









| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|-------------------|--|--------------|-----------------------|-----------------------------------|-----------------------------------|---------|---------------------------|------------------------|
| 4/12/2018 | | EJ-02 | Jointmaster | 253-A07-100 | 4" joint width, 5/8" frame height | Factory Annodized, Black | | | Wall to Wall Assembly |
| 4/12/2018 | | EJ-03 | Jointmaster | 516-A02-100 | 4" joint width, 2" frame height | | | | Floor to Wall Assembly |
| | | EJ-04 | | | | | | | |
| | | EJ-05 | | | | | | | |
| | | EJ-06 | | | | | | | |
| | | EJ-07 | | | | | | | |
| | | EJ-08 | | | | | | | |
| | | <u>DIVISION 8 - OPENINGS</u> | | | | | | | |
| | | <u>084113 - Aluminum Storefront Systems</u> | | | | | | | |
| | | SFT-1 | | | | | | | |
| | | STF-2 | | | | | | | |
| | | <u>084413 - Glazed Aluminum Curtainwall Systems</u> | | | | | | | |
| | | CW-1 | | | | | | | |
| | | CW-2 | | | | | | | |
| | | <u>088000 - Laminated Glass / Security Glass</u> | | | | | | | |
| | | LG-1 | | | | | | | |
| | | LG-2 | | | | | | | |
| | | <u>088000 - Insulated Glazing</u> | | | | | | | |
| | | IG-1 | | | | | | | |
| | | IG-2 | | | | | | | |
| | | IG-3 | | | | | | | |
| | | IG-4 | | | | | | | |
| | | <u>088000 - Monolithic (Single) Glazing</u> | | | | | | | |
| | | MG-1 | | | | | | | |
| | | MG-2 | | | | | | | |
| | | MG-3 | | | | | | | |
| | | MG-4 | | | | | | | |
| | | MG-5 | | | | | | | |
| | | <u>088000 - Spandrel Glass</u> | | | | | | | |
| | | SP-1 | | | | | | | |
| | | SP-2 | | | | | | | |
| | | SP-3 | | | | | | | |
| | | <u>088113 - Decorative Glass/Glazing</u> | | | | | | | |
| 4/10/2018 | | DG-1 | Galaxy Glass | 14414, Antique Mirror | Panels Behind Standing Bar | Integrated Power for Neon Signage | | | |
| | | DG-2 | | | | | | | |












| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|---|--------------|---------------|--------------------------------|----------------|---|-------------------------------|--------------|
| | | <u>088117 - Fire Rated Glazing</u> | | | | | | | |
| | | FRG-1 | | | | | | | |
| | | FRG-2 | | | | | | | |
| | | <u>088400 - Decorative Acrylic</u> | | | | | | | |
| 1/30/2018 |  | DA-1 | 3FORM | CHROMA | GLAZED G15 | | JOLI SANDER (800) 726-0126 (800) 726-0126 | Casino Column Light Covers | |
| | | DA-2 | | | | | | | |
| | | DA-3 | | | | | | | |
| | | DA-4 | | | | | | | |
| | | DA-5 | | | | | | | |
| | | DA-6 | | | | | | | |
| | | DA-7 | | | | | | | |
| | | DA-8 | | | | | | | |
| | | DA-9 | | | | | | | |
| | | DA-10 | | | | | | | |
| | | <u>088853 - Security Glazing</u> | | | | | | | |
| | | SG-1 | | | | | | | |
| | | SG-2 | | | | | | | |
| | | SG-3 | | | | | | | |
| | | <u>089000 - Louvers and Vents</u> | | | | | | | |
| | | LV-1 | | | | | | | |
| | | LV-2 | | | | | | | |
| | | LV-3 | | | | | | | |
| | | Access Doors and Panels | | | | | | | |
| 4/12/2018 | | AD-1 | Nystrom | RUT | Tile ready access door (6"X6") | | | | Restrooms |
| 4/12/2018 | | AD-2 | Nystrom | TS | Security Access Door (30"x30") | | | | Stair Access |
| | | <u>DIVISION 9 - FINISHES</u> | | | | | | | |
| | | <u>092613 - Gypsum Veneer Plastering (Plaster Finish)</u> | | | | | | | |
| 3/21/2018 | | | | | | | | | |
| 3/21/2018 | | | | | | | | | |




| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|---|--------------|------------------------------------|---|----------------|--|---------------------------|----------------------|
| 3/21/2018 | | | | | | | | | |
| | | 092713 - Glass Fiber Reinforced Gypsum Fabrications | | | | | | | |
| | | GFRG-1 | | | | | | | |
| | | GFRG-2 | | | | | | | |
| | | GFRG-3 | | | | | | | |
| | | 093000 - Grout (color and type) | | | | | | | |
| 4/10/2018 | | GRT-1 | Mapei | #93 | Warm Grey | T-1, T-2, T-3 | | | |
| 4/10/2018 | | GRT-2 | Mapei | #02 | Pewter | T-4 | | | |
| | | 093000 - Quarry Tile | | | | | | | |
| | | QT-1 | | | | | | | |
| | | QT-2 | | | | | | | |
| | | 093000 - TILE: Ceramic, Porcelain and Glass | | | | | | | |
| 3/14/2018 |  | T-1 | DALTILE | YORKWOOD | YM03 DEEP WALLNUT, 6x36 | 6X36 | CHRISTY GLIIESPIE 918.809.2376 christy.gillespie@daltile.com | | PUBLIC RESTROOMS |
| 2/22/2018 |  | T-2 | DALTILE | STONE ATTACHE-COLLECTION CONSULATE | EMBASSY SILVER CS07-UNPOLISHED TEXTURED | 12X24 | CHRISTY GLIIESPIE 918.809.2376 christy.gillespie@daltile.com | | PUBLIC RESTROOMS |
| 4/2/2018 |  | T-3 | DALTILE | IDYLLIC BLENDS | SERENE STORM IB04 | | CHRISTY GLIIESPIE918.809.2376christy.gillespie@daltile.com | | PUBLIC RESTROOMS |
| 4/2/2018 |  | T-4 | CROSSVILLE | ALTERED STATE | AV342-STEEL GAZE 12X24 | | JOHN CORBETT(918) 403-8475jcorbett@crossvilleinc.com | | CASINO/POKER DRINK |
| 4/18/2018 | | T-E1 | Existing | Existing | 4" Cove Tile | 4 x 12 | | | Existing Bridge Base |
| | | 093033 - Stone Tile and Slab | | | | | | | |
| | | 095113 - Acoustical Ceiling Panels & Trim (ACP) (MCT) | | | | | | | |
| 1/30/2018 |  | ACP-1 | ARMSTRONG | CIRRIUS, SENCOND LOOK-II | 513, 2'x4' Panel, Beveled Tegular Edge with Prelude XL 15/16" Exposed Tee Grid System | | | | BACK OF HOUSE |

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|---|---|--------|--------------|--------------------|--------------|--|-------------------------------------|--|--------------------|
| 1/30/2018 |  | ACP-2 | ARMSTRONG | CLEAN ROOM FL | | 1716, 2'x4' Washable/Scrubable Panel, Square Lay-in Edge with Prelude XL 15/16" Exposed Tee Grid System | | | EDR KITCHEN |
| 4/6/2018 | | ACP-3 | ARMSTRONG | CALLA | | 2820, 24"x24" Square Tegular 15/16" Exposed Tee Grid System, Black Panels, with Prelude XL 15/16" Exposed Tee Grid | | | ENTERTAINMENT VEN |
| 4/10/2018 | | ACP-4 | ARMSTRONG | Lyra High CAC | | 9731 PB - 24"x24" Panel, Square Tegular with Prelude 9/16" Exposed Tee Grid System - White | Ronnie Williamson | (972) 620-5600 x 1626 | MULTI-PURPOSE SPAC |
| | | MCT-1 | | | | | | | |
| | | MCT-2 | | | | | | | |
| 095115/095123/095133 - Acoustical Ceilings (Metal, Wood, Linear, Plank and Panel) | | | | | | | | | |
| 3/22/2018 |  | AC-1 | ARMSTRONG | METAL WORKS | | TIN IN 56008 IN COPPER | 24X24 WITH SQUARE TEGULAR | Ronnie Williamson (972) 620-5600 x 1626 | ENTERTAINMENT VEN |
| 1/29/2018 |  | AC-2 | ARMSTRONG | METAL WORKS | | TIN IN 6661IN COPPER | 24X24 WITH SQUARE TEGULAR | Ronnie Williamson (972) 620-5600 x 1626 | POKER ROOM, POKER |
| 3/22/2018 |  | AC-3 | ARMSTRONG | METAL WORKS | | TIN IN 56008 | 24X24 WITH SQUARE TEGULAR | Ronnie Williamson (972) 620-5600 x 1626 | MULTI-PURPOSE SPAC |
| 095413 - Open Cell Grid | | | | | | | | | |
| 4/23/2018 |  | OCG-1 | ARMSTRONG | SUSPENSION SYSTEMS | | 1-1/2" CO-EXTRUDED CLEAN ROOM, OPEN GRID MAIN BEAM AND CROSS TEE @ 2' X 2' O.C. EA7927 | CUSTOM COLOR TO MATCH CASINO 3 GRID | Ronnie Williamson (972) 620-5600 x 1626 rwilliamson@adleta.com | CASINO |
| | | OCG-2 | | | | | | | |
| | | OCG-3 | | | | | | | |
| 093000/096513 - Flooring Transition Strips | | | | | | | | | |
| 4/10/2018 | | TS-1 | Schluter | Quadec - Trendline | | Q80TSSG - Stone Grey, 8 mm Aluminum | | | Restrooms |
| 4/10/2018 | | TS-2 | Schluter | Quadec - Trendline | | Q80TSG - Pewter, 8 mm Aluminum | | | Drink Stations |
| 4/10/2018 | | TS-3 | | | | | | | Resin Floor Edges |
| | | TS-4 | | | | | | | |
| | | TS-5 | | | | | | | |
| | | TS-6 | | | | | | | |
| | | TS-7 | | | | | | | |
| | | TS-8 | | | | | | | |
| 096400 - Wood Flooring | | | | | | | | | |

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| 4/10/2018 |  | WF-1 | Terra Legno | Oak Flooring, T &G | Tannery Oak, 3/4" x 7 1/2" x 6' Plank | French White Oak, To match ST-1 | | | Dance Floor |
| | | <u>096513 - Rubber Treads & Risers</u> | | | | | | | |
| | | RTR-1 | | | | | | | |
| | | RTR-2 | | | | | | | |
| | | <u>096513 / 064023 - Wall Base (Rubber/Vinyl/Wood)</u> | | | | | | | |
| 4/2/2018 |  | WB-1 | | 12" WOOD | | STAINED TO MATCH ST-1 | | | ENTERTAINMENT VENUE/CASINO |
| 4/2/2018 |  | WB-2 | | 12" WOOD | | STAINED TO MATCH ST-4 | | | MULTI-PURPOSE |
| 1/30/2018 |  | WB-3 | Mannington Commercial | Mannington Edge (Type TV) 6", Coved | | 932 Espresso | | | BACK OF HOUSE |
| 4/4/2018 |  | WB-4 | | 12" WOOD | | STAINED TO MATCH ST-2 | | | POKER ROOM |
| 4/6/2018 |  | WB-5 | | 12" WOOD | | STAINED TO MATCH ST-3 | | | POKER LOUNGE |
| 4/17/2018 | | WB-6 | | 6" WOOD WITH LAMINATE COVER | | 6" WOOD PROFILE, WRAPPED IN PL-10 | | | COLUMN BASES |
| | | <u>096516 - Sheet Flooring</u> | | | | | | | |
| | | SF-1 | | | | | | | |
| | | SF-2 | | | | | | | |
| | | SF-3 | | | | | | | |
| | | <u>096519 - Floor Tile (Vinyl Composition Tile/Vinyl Floor Tile/Rubber Floor Tile)</u> | | | | | | | |
| 4/9/2018 |  | FT-1 | Armstrong | | | U3040 Bluegrass Barnwood | | | Bar Screens/Low Wall |
| 4/9/2018 |  | FT-2 | Armstrong | | | NA181 Galena Oak | | | Bar Screens/Low Wall |


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| 4/9/2018 |  | FT-3 | Armstrong | | TP053 Barnside | Beach Blonde 9x48" Plank | | | Bar Screens/Low Wall |
| 4/9/2018 |  | FT-4 | Armstrong | | NA195 Avila Oak | Baltic Black 4x36 Plank | | | Floors & Curbs at Entertainment and Drink Stations |
| xxxxxx | | FT-5 | Armstrong | | SDT - Static Dissipative 12x12 | | | | BOH/Utility |
| xxxxxx | | FT-6 | Armstrong | | 12x12 BOH | | | | BOH |
| | | | | | | | | | |
| | | | | | | | | | |
| | | 096623 - Epoxy Terrazzo | | | | | | | |
| | | ET-1 | | | | | | | |
| | | ET-2 | | | | | | | |
| | | ET-3 | | | | | | | |
| | | ET-4 | | | | | | | |
| | | ET-5 | | | | | | | |
| | | | | | | | | | |
| | | 096723 - Epoxy Resinous Flooring | | | | | | | |
| 3/27/2018 |  | RF-1 | STONEHARD | STONETEC | WHITE PLANTINUM, FLOORING INCLUDES 4" COVE BASE | | Jason Maciula 214.680.2492 jmaciula@stonhard.com | | BACK OF HOUSE/ EDR |
| 3/27/2018 |  | RF-2 | STONEHARD | STONETEC | DIABLE BEIGE | | Jason Maciula 214.680.2492 jmaciula@stonhard.com | | PUBLIC RESTROOMS |
| 3/22/2018 |  | RF-3 | STONEHARD | STONETEC | CHARCOAL | | Jason Maciula 214.680.2492 jmaciula@stonhard.com | | ENTERTAINMENT VENUE BAR, MULTI- PURPOSE SPACE CONCESSION AND STANDING BAR |
| | | | | | | | | | |
| | | 096813/096816 - Sheet Carpet & Carpet Tile | | | | | | | |
| 3/22/2018 |  | CPT-1 | MILLIKEN | CUSTOM | COLOR POMS E147, C181, D120, J166, G109, E132 | 36X36, 2 CARPET SQUARE REPEAT | Sherry Hanisko 913.660.3458 Sherry.hanisko@Milliken.com | | CASINO/POKER MEZZANINE, |
| 3/22/2018 |  | CPT-2 | MILLIKEN | CUSTOM | COLOR POMS E179, A179, C179, A181, S148, D133, D1479, B179 | 36X36, 6CARPET SQUARE REPEAT | Sherry Hanisko 913.660.3458 Sherry.hanisko@Milliken.com | | MULTI-PURPOSE SPACE |
| 4/10/2018 |  | CPT-3 | MILLIKEN | CUSTOM | COLOR POMS E182, L100, R171, L176, L171, R173, E183, B182, T100, B180 | 36X36, SURROUND IN MULTI- PURPOSE SPACE | Sherry Hanisko 913.660.3458 Sherry.hanisko@Milliken.com | | MULTI-PURPOSE SPACE |

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| 4/10/2018 |  | CPT-4 | MILLIKEN | REMIX REMASTERED | FREESTYLE, FRS25, HEADROOM WITH TIMELINE :APPLE | 36X36, CARPET SQUARE | Sherry Hanisko 913.660.3458 Sherry.hanisko@Milliken.com | | OFFICES AND ENTERTAINMENT VENUE'S GREEN ROOM |
| 4/10/2018 | | CPT-5 | MILLIKEN | CUSTOM | COLOR POMS E182, L100, R171, L176, L171, R173, E183, B182, T100, B180 | 36X36, 2 CARPET SQUARE REPEAT | Sherry Hanisko 913.660.3458 Sherry.hanisko@Milliken.com | | POKER ROOM |
| 4/18/2018 | | CPT-E1 | EXISTING CASINO CARPET | EXISTING | EXISTING | EXISTING | N/A | | EXISTING CASINO BRIDGE, NEW POKER LOUNGE |
| | | 097200 - Wall Covering (Vinyl, Fabric, Paper, etc.) | | | | | | | |
| 1/29/2018 |  | WC-1 | ARTE | AMAZONE 2 | MAZE #23584 | | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | POKER ROOM |
| 3/8/2018 |  | WC-2 | KOROSEAL | HERITAGE WOOD | WHITE OAK HW29 63 | PL-9/ST-1 | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | ENTERTAINMENT VENUE/MULTI PURPOSE ROOM/CASINO/MEZZ ANINE |
| 2/22/2018 |  | WC-3 | ARTE | MACAU | MACAU-#61226 | | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | RESTROOMS |
| 3/8/2018 |  | WC-4 | LEVEL DEIGITAL WALLCOVERINGS | RECLAIMED | L50101 INTERMIX | | Marci Cather 405.315.9888 marci.cather@nationalwallcoverin g.com | | ENTERTAINMENT VENUE/MULTI- PURPOSE SPACE |
| 3/8/2018 |  | WC-5 | TRI/KES | MALACHITE | L2-M1-03 Moonstone | | Taylor Cronkhite 800-200-8120 ext. 2035 t.cronkhite@tri-kes.com | | MULTI-PURPOSE SPACE |
| 4/10/2018 |  | WC-6 | ARTE | RHAPSODY | ARCO 88023 | | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | ENTERTAINMENT VENUE |
| 4/10/2018 |  | WC-7 | KOROSEAL | CUSTOM | COWHIDE | | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | ENTERTAINMENT VENUE |
| 4/10/2018 |  | WC-8 | KOROSEAL | HERITAGE WOOD | Hickory HW29-56 | PL-7/ST-2 | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | POKER ROOM |
| 4/10/2018 |  | WC-9 | KOROSEAL | HERITAGE WOOD | BLACK WALNUT HW29 97 | PL-8/ST-3 | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | POKER ROOM |
| 4/10/2018 |  | WC-10 | KOROSEAL | HERITAGE WOOD | MAHOGANY HW29 68 | PL-6/ST-4 | DENA EDWARDS W/KOROSEAL (866) 898-5262 dedwards@koroseal.com | | MULTI-PURPOSE SPACE/POKER ROOM |


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|--------------------------------|---|--|----------------------------|---|---|---|---------|---------------------------|--|
| | | 097200 - Wood Veneer Wall Covering | | | | | | | |
| | | WWW-1 | | | | | | | |
| | | WWW-2 | | | | | | | |
| | | 097720 - FABRIC (Fabric Wrapped Tack Board, Fabric Wrapped Panel, Fabric Wall Panel, Furniture Fabric) | | | | | | | |
| | | FWTB-1 | | | | | | | |
| | | FWTB-2 | | | | | | | |
| | | FWP-1 | | | | | | | |
| | | FWP-2 | | | | | | | |
| | | FWP-3 | | | | | | | |
| | | FWP-4 | | | | | | | |
| 4/10/2018 | | FAB-1 | Maharam | "Sheen" 100% Polyurethane Upholstery | 466246-013 Brick, 54" Width, 100,000 double rubs | | | | Booth Seating |
| 4/10/2018 | | FAB-2 | Maharam | "Apt" Silicone/Poly Upholstery | 466392-007 Constellation, 54" Width, 500,000 double rubs | | | | Chair Fabric |
| | | 097727 - Acoustical Wall Panels (AWP) | | | | | | | |
| | | AWP-1 | | | | | | | |
| | | AWP-2 | | | | | | | |
| | | AWP-3 | | | | | | | |
| | | AWP-4 | | | | | | | |
| | | 098436 - Sound Reflecting Panels | | | | | | | |
| | | SRP-1 | | | | | | | |
| | | SRP-2 | | | | | | | |
| | | 099123 - Paint (regular and epoxy) | | | | | | | |
| 3/14/2018 |  | P-1 | SHERWIN-WILLIAMS | N/A | SW2704-MERLOT | | | | ENTERTAINMENT VENUE/MULTI- PURPOSE SPACE/CASINO |
| 4/10/2018 | | P-2 | Existing Paint | N/A | Existing Purple Paint Color | | | | Existing Casino Bridge |
| 4/12/2018 |  | P-3 | Wolf Gordon Scuffmaster | N/A | EM8015B | Harris Collection 3, Environmental, Brushed finish | | | SHELVES |
| 1/29/2018 |  | P-4 | SHERWIN-WILLIAMS | N/A | SW6273 DARK NIGHT | | | | ENTERTAINMENT VENUE/MULTI- PURPOSE SPACE/Poker |
| 4/11/2018 |  | P-5 | SHERWIN-WILLIAMS | N/A | SW6231 ROCK CANDY | | | | Ceilings - Poker, BOH, Restrooms |







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| 4/10/2018 | | P-6 | Existing Paint | N/A | Existing Salmon Paint Color | | | | Existing Casino Bridge |
| 2/15/2018 |  | P-7 | SHERWIN-WILLIAMS | N/A | SW6079, Diverse Beige | | | | Mezzanine Ceilings/BOH |
| 2/15/2018 |  | P-8 | SHERWIN-WILLIAMS | N/A | SW7076, Cyberspace | | | | Bands at Casino and Bar |
| 3/22/2018 |  | P-9 | SHERWIN-WILLIAMS | N/A | SW6082, Cobble Brown | | | | BOH Doors and All First Floor HM Frames |
| 4/10/2018 |  | P-10 | SHERWIN-WILLIAMS | N/A | SW7069, Iron Ore | | | | Mezz HM Doors and Frames |
| 4/4/2018 |  | P-11 | SHERWIN-WILLIAMS | N/A | SW6258 TRICORN BLACK, FLAT | | | | STRUCTURE AND OPEN CEILINGS |
| 4/17/2018 | | P-12 | SHERWIN-WILLIAMS | N/A | SW9059 SILKEN PEACOCK | | | | CASHIER WALLS |
| | | EP-1 | | | | | | | |
| | | EP-2 | | | | | | | |
| | | SFRM-1 | | | | | | | |
| | | SFRM-2 | | | | | | | |
| | | DEP-1 | | | | | | | |
| | | 099600 - High Performance Coatings | | | | | | | |
| | | HPC-1 | | | | | | | |
| | | DIVISION 10 - SPECIALTIES | | | | | | | |
| | | 101100 - Visual Display Surfaces | | | | | | | |
| | | TB-1 | | | | | | | |
| | | TB-2 | | | | | | | |
| | | MB-1 | | | | | | | |
| | | 102113 - Toilet Compartments | | | | | | | |
| | | TP-1 | | | | | | | |
| | | TP-2 | | | | | | | |
| | | 102123 - Privacy Curtains | | | | | | | |
| | | PC-1 | | | | | | | |
| | | PC-2 | | | | | | | |






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| | | 102238 - Operable Partitions | | | | | | | |
| | | OP-1 | | | | | | | |
| | | OP-2 | | | | | | | |
| | | 102600 - Corner Guards | | | | | | | |
| 4/10/2018 | | CG-1 | TBD | | Clear Corner Guards | | | | Restrooms & BOH |
| 4/10/2018 | | CG-2 | TBD | | | | | | BOH |
| | | CG-3 | | | | | | | |
| | | 102600 - IRWC - Impact Resistant Wallcovering | | | | | | | |
| | | IRWC - 1 | | | | | | | |
| | | IRWC - 2 | | | | | | | |
| | | 102800 - Toilet Accessories | | See Specification Section 102800 | | | | | |
| | | TA-1a | | 18" Grab Bar | B-6806.99 x 18 | | | | |
| | | TA-1b | | 24" Grab Bar | B-6806.99 x 24 | | | | |
| | | TA-1c | | 36" Grab Bar | B-6806.99 x 36 | | | | |
| | | TA-1d | | 42" Grab Bar | B-6806.99 x 42 | | | | |
| | | TA-1e | | Shower Wall Grab Bar (36" x 36") | B-6861.99 | | | | |
| | | TA-1f | | Swing-Up Grab Bar | B-4998.99 | | | | |
| | | TA-1g | | 48" Grab Bar | B-6806.99 x 48 | | | | |
| | | TA-2a | | Toilet Tissue Dispenser – Single | B-7685 | | | | |
| | | TA-2b | | Toilet Tissue Dispenser – Double | B-7686 | | | | |
| | | TA-2c | | Toilet Tissue Dispenser – Multi | B-2888 | | | | |
| | | TA-2d | | Toilet Tissue Dispenser – Jumbo | B-2890 | | | | |
| | | TA-3a | | Surface Mounted Roll Paper Towel Dispenser/Waste | B-39619 | | | | |
| | | TA-3b | | Recessed Mounted Roll Paper Towel Dispenser/Waste | B-3961 | | | | |
| | | TA-4a | | Surface Mounted Fold-Paper Towel Dispenser/Waste | B-3699 | | | | |
| | | TA-4b | | Recessed Mounted Fold-Paper Towel Dispenser/Waste | B-369 | | | | |
| | | TA-5a | | Recessed Sanitary Napkin Dispenser | B-352 25 | | | | |
| | | TA-5b | | Surface Mounted Sanitary Napkin Dispenser | B-2706 25 | | | | |
| | | TA-6a | | Surface Mounted Waste Receptacle | B-279 | | | | |
| | | TA-6b | | Semi-Recessed Waste Receptacle | B-364 | | | | |
| | | TA-7 | | Semi-recessed Roll Paper Tower Dispenser | B-38616 | | | | |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|--------|-----------------|---|--|----------------|---------|---------------------------|------------------|
| | | TA-8a | | Surface Mounted Sanitary Napkin Disposal Unit | B-254 | | | | |
| | | TA-8b | | Semi-recessed Sanitary Napkin Disposal Unit | B-353 | | | | |
| | | TA-8c | | Partition Mounted Sanitary Napkin Disposal Unit | B-354 | | | | |
| | | TA-9 | | Surface Mounted Soap Dispenser (Horizontal) | B-2112 | | | | |
| | | TA-10 | | Surface Mounted Soap Dispenser (Vertical) | B-2111 | | | | |
| | | TA-11a | | Mirror, 18" x 36" | B-165 1836 | | | | |
| | | TA-11b | | Mirror, 24" x 36" | B-165 2436 | | | | |
| | | TA-11c | | Mirror, 24" x 60" | B-165 2460 | | | | |
| | | TA-11d | | Mirror, 48" x 36" | B-165 4836 | | | | |
| | | TA-11e | | Mirror, 72" x 36" | B-165 7236 | | | | |
| | | TA-11f | | Mirror, Vandal Resistant, Stainless Steel, Frameless Unit | B-942 | | | | |
| | | TA-12 | | Fixed Tilt Mirror, 18" x 36" | B-293 | | | | |
| | | TA-13a | | Clothes Hook | B-233 | | | | |
| | | TA-13b | | Clothes Hook Strip | B-232 | | | | |
| | | TA-13c | | Not Used. | | | | | |
| | | TA-13d | | Detention Robe Hook | B-983 | | | | |
| | | TA-14 | | Utility Shelf /Mop Holder - 36" | B-224 | | | | |
| | | TA-15 | | Folding Shower Seat | B-5181 | | | | |
| | | TA-16 | | Shower/Dressing Seat | B-5191 | | | | |
| | | TA-17 | | Shower Curtain Rod | B-6047 | | | | |
| | | TA-18a | | Vinyl Shower Curtain, 42" w | 204-2 | | | | |
| | | TA-18b | | Vinyl Shower Curtain, 70" w | 204-3 | | | | |
| | | TA-19 | | Shower Curtain Hook | 204-1 | | | | |
| | | TA-20 | | Surface Mounted Soap Dish | B-680 | | | | |
| | | TA-21a | | 18" Towel Bar | 7674 Gamco | | | | |
| | | TA-21b | | 24" Towel Bar | 7674 Gamco | | | | |
| | | TA-21c | | Stainless Steel Towel Hook | B-6777 | | | | |
| | | TA-22a | | Baby Changing Table - Horizontal | Koala Corp.: KB200 | | | | |
| | | TA-22b | | Baby Changing Table - Vertical | Koala Corp.: KB101 | | | | |
| | | TA-23 | | Drain/Supply Insulation | TRUEBRO Insulation kit or McGuire Pro Wrap | | | | |
| | | TA-24 | | Call For Aid | Refer to Division 26 | | | | |
| |  | TA-25 | Global Partners | Toilet Compartment/Floor Anchored/Overhead Braced | Global Partners | Model # | | | Public Restrooms |
| | | TA-26 | Global Partners | Urinal Screen | Global Partners | Model # | | | Public Restrooms |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|-------------------|---|--------------|--|---|----------------|--------------------|---------------------------|----------|
| | | TA-27 | | Soap Dispenser - Shelf Type | B-2014 | | | | |
| | | TA-28 | | Soap Dispenser - Counter Mounted | B-8221 | | | | |
| | | TA-29 | | Mirror Cabinet | A&J Washroom U-720 | | | | |
| | | TA-30 | | Small Paper Towel Dispenser | B-2621 | | | | |
| | | TA-31 | | Folding Purse Shelf | B-287 | | | | |
| | | TA-32a | | Hand Dryer – Automatic | Dyson "Airblade"™ Electric Hand Dryer Model AB04. | | | | |
| | | TA-32b | | Hand Dryer – Automatic | B-7120/B-7128 | | | | |
| | | TA-33 | | Hand Dryer – Touch Start | B-731 | | | | |
| | | TA-34 | | Recess Stainless Steel Soap Dish | B-4380 | | | | |
| | | TA-35 | | Toilet Seat Cover Dispenser | B-221 | | | | |
| | | TA-36 | | Sharps Disposal Container Unit | | | | | |
| | | <u>105113 - Lockers (Type)</u> | | | | | | | |
| 4/10/2018 | | L-1 | | Two Tier Lockers | Off White/Cream | | | | |
| | | L-2 | | | | | | | |
| | | L-3 | | | | | | | |
| | | <u>104413 Fire Extinguisher Cabinet (FEC)</u> | | | | | | | |
| | 04/12/18 | FEC-1 | Nystrom | Full Recessed Stainless Steel Cabinet | Alpine FC-70 | | NON-Rated | | FOH |
| | 04/12/18 | FEC-2 | Nystrom | Rated, Full Recessed Stainless Steel Cabinet | Alpine FC-FRC70 | | FIRE RATED WALLS | | FOH |
| | 04/12/18 | FEC-3 | Nystrom | Full Recessed Aluminum White Cabinet | Ridge FC-73 | | NON-Rated | | BOH |
| | 04/12/18 | FEC-4 | Nystrom | Rated, Full Recessed Aluminum White Cabinet | Ridge FC-FRC73 | | FIRE RATED WALLS | | BOH |
| | 04/12/18 | FE-1 | Nystrom | EX-30 | Wall Mounted Extinguisher | | Bracket Attachment | | BOH |
| | | <u>105113 - Locker Type/Colors</u> | | | | | | | |
| | | LOC-1 | | | | | | | |
| | | LOC-2 | | | | | | | |
| | | LOC-3 | | | | | | | |
| | | <u>108400 - Bird Deterent System</u> | | | | | | | |
| | | BD-1 | | | | | | | |
| | | BD-2 | | | | | | | |
| | | <u>113100 - Residential (type) Appliances</u> | | | | | | | |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|--|--------------|------------------------|-----------------------------|----------------------------------|--|---------------------------|--|
| | | RA-1 | | | | | | | |
| | | RA-2 | | | | | | | |
| | | RA-3 | | | | | | | |
| | | 116143 - Stage Curtains | | | | | | | |
| | | C-1 | | | | | | | |
| | | C-2 | | | | | | | |
| | | 116623 - Gymnasium Equipment | | | | | | | |
| | | WP-1 | | | | | | | |
| | | WP-2 | | | | | | | |
| | | <u>DIVISION 12 - FURNISHINGS</u> | | | | | | | |
| | | 122413 - Window Treatment (Roller Shades, Horizontal and Vertical Louver Blinds) | | | | | | | |
| | | WT-1 | | | | | | | |
| | | 123613 - Precast Concrete Countertops | | | | | | | |
| 1/30/2018 |  | ARC-2 | BOMANITE | MIRRORED SPECKS | LIGHT GREY EX-SSA-100112-10 | TO HAVE AN EPOXY FINISH TOP COAT | SCOTT LYNCH 918.744.6272 | | ENTERTAINMENT VENUE BAR TOP AND CASINO BAR TOP |
| | | 123640 - Stone Countertops | | | | | | | |
| 4/2/2018 |  | STN-1 | DALTILE | 3CM THICK GRANITE SLAB | L191 CHENILLE WHITE | | CHRISTY GLIIESPIE 918.809.2376 christy.gillespie@daltile.com | | PUBLIC RESTROOMS VANITIES |
| | | 124813 - Walk Off Mat | | | | | | | |
| 1/29/2018 |  | WM-1 | MATSINC | SUPER NOP 52 | GRIJIS/CHARCOAL | | TBD | | Vestibules & Elevators |
| | | WM-2 | | | | | | | |
| | | WM-3 | | | | | | | |
| | | <u>DIVISION 13 - SPECIAL CONSTRUCTION</u> | | | | | | | |
| | | <u>DIVISION 14 - CONVEYING SYSTEMS</u> | | | | | | | |
| | | 142100 - Electric Traction Elevators | | | | | | | |
| | | ELEV-1 | | | | | | | |
| | | ELEV-2 | | | | | | | |
| | | ELEV-3 | | | | | | | |
| | | ELEV-4 | | | | | | | |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|---------------------------------|-----------------------|---|----------------------------------|-------------------|---------|---------------------------|---|
| | | 142400 - Hydraulic Elevators | | | | | | | |
| 4/10/2018 | | ELEV-1 | Otis Elevator | | | | | | |
| | | ELEV-2 | | | | | | | |
| | | ELEV-3 | | | | | | | |
| | | ELEV-4 | | | | | | | |
| | | DIVISION 22 - PLUMBING | | | | | | | |
| | | DIVISION 23 - MECHANICAL | | | | | | | |
| 3/21/2018 | | | | | | | | | |
| | | DIVISION 26 - ELECTRICAL | | | | | | | |
| 2/19/2018 |  | L-1 | SHADES OF LIGHT | WEATHERED INDUSTRIAL CAGED PENDANT LARGE | CH16103 CO/COPPER PATINA | 2 LIGHT, 100 WATT | TBD | | ENTERTAINMENT VENUE |
| 2/19/2018 |  | L-2.1 | SHADES OF LIGHT | INDUSTRIAL CAGE WORK LIGHT CHANDELIER | CH10060 IR/AGED IRON | 5 LIGHT, 40 WATT | TBD | | ENTERTAINMENT VENUE |
| 2/19/2018 |  | L-2.2 | SHADES OF LIGHT | MODERN MASON JAR CLUSTER CHANDELIER 6 LIGHT | CH14071 BZ/VINTAGE BRONZE | 6 LIGHT, 100 WATT | TBD | | ENTERTAINMENT VENUE/MULTI-PURPOSE SPACE |
| 2/19/2018 |  | L-3 | SHADES OF LIGHT | METAL BUSHEL BASKETPENDANT-LARGE | PE16146 | 1 LIGHT (EDISON) | TBD | | ENTERTAINMENT VENUE-VIP MEZZANINE |
| 2/19/2018 |  | L-4 | RESTRORATION HARDWARE | VINTAGE BARN SCONCE | WEATHERED RUST | 60 WATT MAX | TBD | | ENTERTAINMENT VENUE |
| 2/19/2018 |  | L-5 | SHADES OF LIGHT | WIRE SPHERE CRYSTAL CHANDELIER | CH15114/BRONZE, CRYSTAL AND WOOD | 5 LIGHT, 60 WATT | TBD | | MULTI-PURPOSE SPACE |
| 4/11/2018 | | L-6 | | | | | | | |

| Revision/ Insertion Date | Material Image | FINISH | MANUFACTURER | STYLE/PATTERN | NUMBER/COLOR | MATERIAL NOTES | CONTACT | APPROXIMATE LEAD TIMES | LOCATION |
|--------------------------------|---|--------|----------------------|------------------------------------|----------------|------------------|---------|---------------------------|---------------------|
| 4/11/2018 | | L-7 | | | | | | | |
| 2/19/2018 |  | L-8 | TROY LIGHTING | MCCOY WALL SCONCE | B5421 | 1-60 WATT | TBD | | POKER ROOM |
| 3/8/2018 |  | L-9 | SHADES OF LIGHT | CHICKEN WIRE BASKET CHANDELIER | CH15089 | 3 LIGHT, 40 WATT | TBD | | MULTI-PURPOSE SPACE |
| 3/21/2018 |  | L-10 | MICHIGAN CHANDEILIER | 12 LIGHT CHANDELIER | ID# 958479 | CHROME | TBD | | MULTI-PURPOSE SPACE |
| 3/25/2018 |  | L-11 | SHADES OF LIGHT | URBAN LOFT CHANDELIER | SKU CHCO824 BZ | DARK BROZE/CREAM | | | PUBLIC RESTROOMS |
| 4/6/2018 |  | L-12 | SHADES OF LIGHT | INDUSTRIAL CAGE WORK LIGHT PENDANT | PE10028 IR | 1 LIGHT, 60 WATT | | | BAR CANOPY |

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 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
 - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.
 - 3. Complete, decorative ceiling cloud assemblies at auditorium capable of withstanding structural and other loads.
- B. Related Sections include the following:
 - 1. Section 054000 "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.
 - 2. Division 07 Section "Thermal Insulation" for insulation installed with Z-shaped furring members.
 - 3. Division 07 Section "Fire-Resistive Joint Systems" for head-of-wall joint systems installed with non-load-bearing steel framing.
 - 4. Division 09 Section "Gypsum Board Shaft-Wall Assemblies" for non-load-bearing metal shaft-wall framing, gypsum panels, and other components of shaft-wall assemblies.

1.3 SUBMITTALS:

- A. Product Data: For each type of product indicated.
 - 1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."
- B. Coordination Drawings: Auditorium cloud reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Show layout, spacings, sizes, thicknesses, and types of metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, accessories, connection details, and attachment to adjoining work.
 - 2. Ceiling suspension system members.

3. Method of attaching hangers to building structure.
 - a. Furnish layouts for anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
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).
6. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 QUALITY ASSURANCE:

- 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.
- C. Qualification Data: For professional engineer.

1.5 CUSTOM GAMING CLOUD FRAMING:

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- B. Seismic Standard: Provide custom ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 2. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL:

- A. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

- B. 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, hot-dip galvanized, unless otherwise indicated.

2.2 SUSPENSION SYSTEM COMPONENTS:

- A. 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: Cast-in-place anchor, designed for attachment to concrete forms, or Postinstalled, expansion anchor.
 - 2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
- B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12-mm) diameter.
- C. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Armstrong World Industries, Inc.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; 640-C Drywall Furring System.
 - c. USG Corporation; Drywall Suspension System.
 - d. CertainTeed Corporation: 1-1/2" Drywall Suspension System and Quickspan Grid System.

2.3 STEEL FRAMING FOR FRAMED ASSEMBLIES:

- A. 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: 0.0312 inch (0.79 mm)(20 gauge).
 - b. Depth: As indicated on Drawings.
 - 2. Dimpled Steel Studs and Runners:

- a. Minimum Base-Metal Thickness: 0.025 inch (0.64 mm) (20 gauge equivalent).
- b. Depth: As indicated on Drawings.
- c. Basis of Design: Dietrich UltraSTEEL Framing or one of the following:
 - 1) Viperstud; Marino\WARE.
 - 2) Or equal.

B. Slip-Type Head Joints: Where indicated, provide one of the following:

- 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
- 2. 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, provide one of the following:
 - 1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 - 2) MBA Building Supplies; FlatSteel Deflection Track.
 - 3) Steel Network Inc. (The); VertiClip SLD Series.
 - 4) Superior Metal Trim; Superior Flex Track System (SFT).
 - 5) Or equal.

C. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

- 1. Minimum Base-Metal Thickness: 0.0312 inch (0.79 mm).

D. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

- 1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
- 2. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B, structural steel, Grade 33 (Grade 230); 0.0966-inch (2.5-mm), 0.0677-inch (1.7-mm) minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
- 3. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Unistrut Corp.
 - b. Flex-Strut, Inc.
 - c. Haydon Corporation.

2.4 AUXILIARY MATERIALS:

A. General: Provide auxiliary materials that comply with referenced installation standards.

- 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

- B. Isolation Strip at Exterior Walls: Provide one of the following:
1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
1. 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 (600 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, except comply with framing sizes and spacing indicated.
1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.

- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING SUSPENSION SYSTEMS:

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- 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. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - 5. Do not attach hangers to steel roof deck.
 - 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

- G. 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.

3.5 INSTALLING FRAMED ASSEMBLIES:

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs as follows:
 - a. Single-Layer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
 - b. Multilayer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
 - c. Tile backing panels: 16 inches (406 mm) o.c., unless otherwise indicated.
- C. 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 (12.7-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.
 - 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs 6 inches (150 mm) o.c.

- D. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

- E. Z-Furring Members:
 - 1. Erect insulation (specified in Division 7 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 (600 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 (300 mm) from corner and cut insulation to fit.

- F. 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.

3.6 CUSTOM CEILING CLOUDS CONSTRUCTION:

- A. Identify actual brand name products used for every product, except commodity products specified by performance or description.
- B. Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
- C. Provide manufacturer's product literature for each brand name product.
- D. Provide the manufacturer's certification that the product used on the project complies with the contract documents.
- E. Secure custom ceiling to existing structure in accordance with fabricators Shop Drawings. 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 structure to which hangers are attached and 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.

END OF SECTION 092216

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.
 - 3. Acoustical joint sealant.
 - 4. Expanded metal mesh installed behind drywall at security areas.
- B. Related Sections include the following:
 - 1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
 - 2. Division 09 Section "Gypsum Shaft Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
 - 3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 SUBMITTALS:

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE:

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

- C. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for the following:
 - a. Each level of gypsum board finish indicated for use in exposed locations.
 - b. Each texture finish indicated.
 - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
 - 3. Simulate finished lighting conditions for review of mockups.
 - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 STORAGE AND HANDLING:

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL:

- A. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 8 percent by weight.
- B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.2 INTERIOR GYPSUM BOARD:

- A. General: Complying with ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Continental Building Products, LLC.
 - d. Georgia-Pacific Building Products.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Building Products by Georgia-Pacific.
 - h. USG.

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.

- C. Abuse-Resistant Gypsum Board: ASTM C 1629/C 1629M.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.
 - 3. Surface Abrasion: Meets or exceeds Level 1 requirements.
 - 4. Surface Indentation: Meets or exceeds Level 1 requirements.
 - 5. Products: Provide one of the following:
 - a. Fiberrock Abuse-Resistant Interior Panels; United States Gypsum Company.
 - b. Gold Bond Hi-Abuse XP Gypsum Board; National Gypsum.
 - c. Extreme Abuse Resistant Type X Gypsum Board; CertainTeed.
 - d. Tough Rock Abuse-Resistant Interior Panel; Georgia Pacific.

- D. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.
 - 3. Products: Provide one of the following:
 - a. Sheetrock Brand Mold Tough VHI, Firecode Core; United States Gypsum Company.
 - b. Gold Bond Hi-Impact XP Gypsum Board; National Gypsum.
 - c. Moisture and Mold Resistant Extra Abuse Type X with M2Tec; CertainTeed.
 - d. DensArmor Plus® Impact-Resistant Interior Panel; Georgia Pacific.

2.3 TILE BACKING PANELS:

- A. Glass-Mat, Water-Resistant Backing Board:
 - 1. Complying with ASTM C 1178/C 1178M.
 - 2. Products: Provide one of the following:
 - a. "DensShield Tile Backer" by G-P Gypsum.
 - b. "GlasRoc" Brand; CertainTeed.
 - c. "Fiberock Tile Backerboard; United States Gypsum Company.
 - 3. "eXP Tile Backer;" National Gypsum Company.
 - 4. Core: 5/8 inch (15.9 mm), Type X.
 - 5. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

- B. Cementitious Backer Units: ANSI A118.9.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Custom Building Products; Wonderboard.
 - b. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - c. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 5/8 inch.

2.4 TRIM ACCESSORIES:

- A. Corner Trim, Edge Trim, Inside Corner Trim: **NO-COAT copolymer tapered plastic trim with face and joint tape backing as manufactured by CertainTeed**, or equal. Trims shall be engineered for fully bonded adhesive application with joint compound and without mechanical fasteners.
 - 1. Types:
 - a. Wall Corner Trim: NO-COAT Stick.
 - b. Inside Corner: LEVELLINE Flexible Corner.
 - c. Edge Trim: NO-COAT "L" Trim.
 - d. Vaults/Soffits: LEVELLINE Pro Corner, or NO-COAT Flexible Corner.
 - 2. Install in a full bed of all-purpose or taping joint compound without mechanical fasteners and in accordance with manufacturer's instructions.
 - 3. Interior Trim: ASTM C 1047.

- B. Metal Trim Accessories: ASTM C 1047.
 - 1. Material: Steel sheet zinc coated by hot-dip process or rolled zinc.

2. Shapes:
 - a. J-Trim with both face and back flanges; face flange formed to receive joint compound. Use J-trim for edge trim where indicated.
 - b. Expansion (control) joint: One-piece control joint formed with V-shaped slot and removable strip covering slot opening.
3. Products: Provide the following products, or accepted equal subject to compliance with requirements:
 - a. J-Trim: **No. 200-A** metal trim, United States Gypsum Co., or equal.
 - b. Control Joint: **No. 093** control joint, United States Gypsum Co., or equal.

C. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fry Reglet Corp.
 - b. Gordon, Inc.
 - c. Pittcon Industries.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 (ASTM B 221M), Alloy 6063-T5.
3. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.
4. Z-Reveal Molding: Match #DRMZ-625-625; Fry Reglet.
 - a. Molding Depth: 5/8 inch.
 - b. Reveal Width: Varies. As indicated on drawings.

2.5 JOINT TREATMENT MATERIALS:

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 1. Interior Gypsum Wallboard: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.6 AUXILIARY MATERIALS:

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from slag wool, or rock wool.
 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 2. Where slag-wool-fiber/rock-wool-fiber blanket insulation, or sound attenuation insulation is indicated by the following thicknesses, provide blankets in batt form with thermal resistance indicated:
 - a. Nominal density of 2.5 lb/cu. ft.
 - 1) R-Value: 3.7 per inch of thickness.
 - 2) Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 85 percent by weight.
 - b. Fiberglass insulation will not be accepted.

- E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
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. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.
 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Flattened, Expanded Metal Security Mesh: 1.33" x 3.2" expanded metal mesh, flattened, #ASM1.5-9F; AMICO Security Products, tel:(800) 366-2642, or approved equivalent by one of the following:
1. McNichols Co.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL:

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. 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. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD:

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: As indicated on Drawings.
 - 2. Type X: As indicated on Drawings.
 - 3. Abuse-Resistant Type: As indicated on Drawings.
 - 4. Moisture- and Mold-Resistant Type: As indicated on Drawings.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS:

- A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.

- C. Areas Not Subject to Wetting: Install moisture resistant-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive tile-backer resistant panels.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES:

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.
 - 4. U-Bead: Use at exposed panel edges.
 - 5. Curved-Edge Cornerbead: Use at curved openings.

3.6 FINISHING GYPSUM BOARD:

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile, or acoustical tile.
 - 3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 9 Sections.
 - 4. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Glass-Mat Gypsum Board: Finish according to manufacturer's written instructions.

- F. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.

3.7 PROTECTION:

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Ceramic mosaic tile.
 - 2. Porcelain paver tile.
 - 3. Substrate board for curved walls.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for monolithic slab finishes specified for tile substrates.
 - 2. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
 - 3. Section 090001 "Schedule of Finishes" for tile products.
 - 4. Section 092900 "Gypsum Board" for moisture resistant gypsum board installed in gypsum wallboard assemblies.
 - 5. Section 096340 "Stone Flooring."

1.3 DEFINITIONS:

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. ISO 13007 Standards for Ceramic Tiles, Adhesives and Grouts.
- D. Module Size: Actual tile size plus joint width indicated.
- E. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS:

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - 1. Level Surfaces: Minimum 0.6.

1.5 PREINSTALLATION MEETINGS:

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.6 SUBMITTALS:

- A. Product Data: For each type of tile, mortar, grout, and other products specified.
- B. Shop Drawings: For the following:
 - 1. Tile patterns and locations.
 - 2. Widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Tile Samples for Initial Selection: Manufacturer's color charts consisting of actual tiles or sections of tiles showing the full range of colors, textures, and patterns available for each type and composition of tile indicated. Include Samples of accessories involving color selection.
- D. Grout Samples for Initial Selection: Manufacturer's color charts consisting of actual sections of grout showing the full range of colors available for each type of grout indicated.
- E. Samples for Verification: Of each item listed below, prepared on Samples of size and construction indicated. Where products involve normal color and texture variations, include Sample sets showing the full range of variations expected.
 - 1. Each type and composition of tile and for each color and texture required, at least 12 inches square, mounted on braced cementitious backer units, and with grouted joints using product complying with specified requirements and approved for completed work in color or colors selected by Architect.
 - 2. Full-size units of each type of trim and accessory for each color required.
 - 3. Metal edge strips in 6-inch lengths.
- F. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- G. Product Certificates: Signed by manufacturers certifying that the products furnished comply with requirements.

- H. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information specified.
- I. Setting Material Test Reports: Indicate and interpret test results for compliance of tile-setting and -grouting products with specified requirements.

1.7 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Source Limitations for Tile: Obtain each color, grade, finish, type, composition, and variety of tile from one source with resources to provide products from the same production run for each contiguous area of consistent quality in appearance and physical properties without delaying the Work.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products: Obtain each of the following products specified in this Section from one source and by a single manufacturer for each product:
 - 1. Joint sealants.
 - 2. Waterproofing.
- E. Mockups: Before installing tile, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for completed Work.
 - 1. Locate mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - 2. Build mockup of floor tile installation.
 - 3. Build mockup of wall tile installation.
 - 4. Notify Architect 7 days in advance of the dates and times when mockups will be constructed.
 - 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 6. Obtain Architect's approval of mockups before proceeding with final unit of Work.
 - 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - a. When directed, demolish and remove mockups from Project site.
 - b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement of ANSI A137.1 for labeling sealed tile packages.
- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.
- C. Handle tile with temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained to comply with referenced standards and manufacturer's written instructions.

1.10 EXTRA MATERIALS:

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Tile Products:
 - a. American Olean Tile Company.
 - b. Crossville Ceramics.
 - c. Dal-Tile Corporation.
 - d. Summitville Tiles, Inc.
 - e. United States Ceramic Tile Company.

2.2 PRODUCTS, GENERAL:

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard Grade requirements, unless otherwise indicated.

2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting Materials" and "Grouting Materials" articles.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
1. Match Architect's samples.
 2. Match colors, textures, and patterns indicated by referencing manufacturer's standard designations for these characteristics.
 3. Provide Architect's selections from manufacturer's full range of colors, textures, and patterns for products of type indicated.
 4. Provide tile trim and accessories that match color and finish of adjoining flat tile.
- D. Factory Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, blend tile in the factory and package so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples.
- E. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer, unless another mounting method is indicated.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS:

- A. Products [T-(#)]: Reference Section 090001 "Schedule of Finishes.

2.4 SETTING MATERIALS:

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4 and ISO 13007; C2ES2P2.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ardex Americas.
 - b. Boiardi Products Corporation; a QEP company.
 - c. Bonsal American; an Oldcastle company.
 - d. Bostik, Inc.
 - e. C-Cure.
 - f. Custom Building Products.
 - g. Laticrete International, Inc.
 - h. MAPEI Corporation.
 - i. Summitville Tiles, Inc.

2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4 and the ISO T standard.-2.1.2.

2.5 GROUTING MATERIALS:

- A. High-Performance Tile Grout: Non-staining, ANSI A118.6, A118.3.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Plasma; Laticrete International, Inc.** or a comparable product by one of the following:
 - a. Ardex FG-C; Ardex Americas.
 - b. FlexcolorCQ; MAPEI Corporation
 - c. InColorAdvanced Performance Grout; TEC; H. B. Fuller Construction Products Inc.

2.6 ELASTOMERIC SEALANTS:

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements of Division 7 Section "Joint Sealants."
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints, unless otherwise indicated.
- 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.
- D. Products: Subject to compliance with requirements, provide one of the following:
 1. Multipart, Pourable Urethane Sealants:
 - a. Chem-Calk 550; Bostik.
 - b. Vulkem 245; Mameco International, Inc.
 - c. NR-200 Urexpan; Pecora Corp.
 - d. THC-900; Tremco, Inc.

2.7 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. Temporary Protective Coating: Provide product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; is compatible with tile, mortar, and grout products; and is easily removable after grouting is completed without damaging grout or tile.
 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.

2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as a temporary protective coating for tile.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- D. Metal Edge Strips: White-zinc-alloy terrazzo strips, 1/8 inch wide at top edge with integral provision for anchorage to mortar bed or substrate, unless otherwise indicated.
 1. Products [TS-(#)]: Reference Section 090001 "Schedule of Finishes.
- E. Substrate Board for Curved Walls: Schluter-KERDI-BOARD-V, vertically grooved substrate and building panel for creating curved elements.
 1. Thickness: 3/4 inch.
 2. Fasteners: Mount KERDI-BOARD vertically or horizontally on wood or metal framing with screws and corresponding KERDI-BOARD-ZT washers. Abut the individual panels over the center of the studs or other solid backing.

2.8 MIXING MORTARS AND GROUT:

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

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 from oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 series of tile installation standards for installations indicated.
 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust latter in consultation with Architect.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Remove coatings, including curing compounds, and other substances that contain soap, wax, oil, or silicone and are incompatible with tile-setting materials by using a terrazzo or concrete grinder, a drum sander, or a polishing machine equipped with a heavy-duty wire brush.
- B. Provide concrete substrates for tile floors installed with dry-set or latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.
 - 1. Use trowelable leveling and patching compounds per tile-setting material manufacturer's written instructions to fill cracks, holes, and depressions.
 - 2. Remove protrusions, bumps, and ridges by sanding or grinding.
- C. Blending: For tile exhibiting color variations within the ranges selected during Sample submittals, verify that tile has been blended in the factory and packaged so tile units taken from one package show the same range in colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent adhesion or staining of exposed tile surfaces by grout, protect exposed surfaces of tile against adherence of mortar and grout by precoating them with a continuous film of temporary protective coating indicated below, taking care not to coat unexposed tile surfaces:
 - 1. Grout release.

3.3 INSTALLATION, GENERAL:

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

- E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are the same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
 - 2. Prepare joints and apply sealants to comply with requirements of Division 7 Section "Joint Sealants."
- G. Grout tile to comply with the requirements of the following tile installation standards:
 - 1. For ceramic tile grouts (sand-portland cement, dry-set, commercial portland cement, and latex-portland cement grouts), comply with ANSI A108.10.

3.4 WATERPROOFING INSTALLATION:

- A. Install waterproofing to comply with waterproofing manufacturer's written instructions to produce a waterproof membrane of uniform thickness bonded securely to substrate.
- B. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.5 FLOOR TILE INSTALLATION:

- A. General: Install tile to comply with requirements in the Ceramic Tile Floor Installation Schedule, including those referencing TCA installation methods and ANSI A108 series of tile installation standards.
- B. Joint Widths: Install tile on floors with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch.
 - 2. Paver Tile: 1/4 inch (6 mm).
- C. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

3.6 CLEANING AND PROTECTING:

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex-portland cement grout residue from tile as soon as possible.

2. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Protect metal surfaces, cast iron, and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
 3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to brick and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure tile is without damage or deterioration at the time of Substantial Completion.
1. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
 2. Prohibit foot and wheel traffic from tiled floors for at least 7 days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.7 CERAMIC TILE FLOOR INSTALLATION SCHEDULE:

- A. Interior Floor Installations, Concrete Slab Sub-Floor: Where floor installations of this designation are indicated, comply with the following:
1. Installation Method: TCA F113 (latex-portland cement mortar bonded to concrete slab on grade).
 - a. Thinset Mortar: Latex- portland cement mortar.
 - 1) Polymer enriched cement mortar..
 - b. Grout: High-performance unsanded grout.
 - 1) Plasma; Laticrete International, Inc.
 - 2) Color: See section 090001 "Schedule of Finishes."
 - c. Provide crack isolation membrane under all floor tile larger than 12-inches in any dimension.

3.8 CERAMIC TILE WALL INSTALLATION SCHEDULE:

A. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation: TCNA W245 or TCNA W248; thinset mortar on glass-mat, water-resistant gypsum backer board.
 - a. Thinset Mortar: Latex- portland cement mortar.
 - 1) Polymer enriched cement mortar.
 - b. Grout: High-performance unsanded grout.
 - 1) Plasma; Laticrete International, Inc.
 - 2) Color: See section 090001 "Schedule of Finishes."

END OF SECTION 093000

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 DEFINITIONS:

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS:

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on 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. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
 - 4. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96).
- 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 Panel: Set of 6-inch- (150-mm-) square of each type, color, pattern, and texture.
 - 2. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch- (300-mm-) long Samples of each type, finish, and color.
- E. Qualification Data: For testing agency.
- F. Field quality-control test reports.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical panel ceiling.
- H. Research/Evaluation Reports: For each acoustical panel ceiling and components and anchor and fastener type.
- I. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE:

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type through one source from a single manufacturer.
 - 2. Suspension System: Obtain each type through one source from a single manufacturer.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - b. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less.
- D. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:

1. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

1.8 COORDINATION:

- A. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.9 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Acoustical Ceiling Panels: Full-size panels equal to 2.0 percent of quantity installed.
 2. Suspension System Components: Quantity of each exposed component equal to 2.0 percent of quantity installed.

PART 2 - PRODUCTS

2.1 ACOUSTICAL PANELS, GENERAL:

- A. Recycled Content: Provide acoustical panels with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 50 percent by weight.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
- C. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels 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.
- D. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- E. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING (ACP-1)

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. "Cirrus Second Look II", #513," with HumidGuard Plus; Armstrong World Industries, Inc.
 - 2. "Eclipse Illusion", #78785; United States Gypsum.
- B. Classification: Provide panels complying with ASTM E 1264 for type and form as follows:
 - 1. Type and Form: Type III, mineral base with painted finish; Form 1.

- 2. Pattern: EIK.
- C. Color: White.
- D. LR: Not less than 0.85.
- E. NRC: Not less than 0.65, Type E-400 mounting per ASTM E 795.
- F. CAC: Not less than 35.
- G. Edge/Joint Detail: Beveled Tegular.
- H. Thickness: $\frac{3}{4}$ inch (19 mm).
- I. Modular Size: 24 by 48 inches (610 by 1220 mm).

2.3 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING [ACP-2]:

- A. Products: Provide one of the following:
 - 1. Armstrong World Industries, Inc.; "Clean Room FL, #1716."
 - 2. USG Interiors, Inc.; "Clean Room Climaplus Class 100 Panels, #56091."
- B. Classification: Provide Class A (UL), panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type IV, mineral base with painted finish; Form 2, water felted.
 - 2. Pattern: G,H, unperforated
- C. Color: White.
- D. LR: Not less than LR-1 (0.79).
- E. NRC: N/A.
- F. AC: N/A.
- G. CAC: Not less than 35.
- H. Edge Detail: Square.
- I. Thickness: $\frac{3}{4}$ inch.
- J. Modular Size: 24 by 48 inches (610 by 1220 mm)
- K. Warranty: 30 years against visible sag. 104 deg., 90 percent relative humidity.

2.4 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING [ACP-3]:

- A. Products: Provide one of the following:
 - 1. Armstrong World Industries, Inc.; "Cala, #2820."
 - 2. USG Interiors, Inc.; No known product.
- B. Classification: Provide Class A (UL), panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type IV, mineral base with painted finish; Form 2, water felted.
 - 2. Pattern: E.
- C. Color: Black.
- D. LR: Not less than LR-1 (0.86).
- E. NRC: 0.85.
- F. AC: NA.
- G. CAC: Not less than 35.
- H. Edge Detail: Square.
- I. Thickness: 1inch.
- J. Modular Size: 24 by 24 inches (610 by 610 mm)
- K. Warranty: 30 years against visible sag. 104 deg., 90 percent relative humidity.

2.5 ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING [ACP-4]:

- A. Products: Provide one of the following:
 - 1. Armstrong World Industries, Inc.; "Lyra High CAC, #8731PB."
 - 2. USG Interiors, Inc.; No known product.
- B. Classification: Provide Class A (UL), panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type XII, mineral base with painted finish; Form 2, water felted.
 - 2. Pattern: E.
- C. Color: White.
- D. LR: Not less than LR-1 (0.88).
- E. NRC: 0.95.

- F. AC: NA.
- G. CAC: Not less than 42.
- H. Edge Detail: Square Tegular.
- I. Thickness: 1-3/4inch.
- J. Modular Size: 24 by 24 inches (610 by 610 mm)
- K. Warranty: 30 years against visible sag. 104 deg., 90 percent relative humidity.

2.6 METAL SUSPENSION SYSTEMS, GENERAL:

- A. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 5 percent.
- B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- C. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - 1. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- D. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
- E. 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 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
 - F. Hanger Rods/ Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
 - G. 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.
 - H. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
 - I. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
 - J. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
 - K. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced 24 inches (610 mm) o.c. on all cross tees.
 - L. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.7 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING [ACP-1], [ACP-3]:

- A. Products: Subject to compliance with requirements, provide one of the following:
 1. Armstrong World Industries, Inc.; Prelude XL 15/16" Exposed Tee System.
 2. USG Interiors, Inc.; Donn DX.
- B. Wide-Face, Capped, Double-Web, Hot-Dip Galvanized, G60 (Z180), Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation, with prefinished, cold-rolled, 15/16-inch- (24-mm-) wide, steel caps on flanges.
 1. Structural Classification: Intermediate-duty system.
 2. Face Design: Flat, flush.

3. Face Finish:
 - a. **ACP-1:** Painted white.
 - b. **ACP-3:** Painted black.

2.8 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING [ACP-2]:

- A. Products: Subject to compliance with requirements, provide one of the following:
 1. Armstrong World Industries, Inc.; Prelude Plus XL 15/16" Fire Guard, Exposed Tee System.
 2. USG Interiors, Inc.; Donn ZXLA.
- B. Wide-Face, Capped, Double-Web, Fire-Rated, Hot-Dip Galvanized, G60 (Z180), Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation, with prefinished, cold-rolled, 15/16-inch- (24-mm-) wide, aluminum caps on flanges.
 1. Structural Classification: Intermediate-duty system.
 2. Face Design: Flat, flush.
 3. Face Finish: Painted white.

2.9 METAL SUSPENSION SYSTEM FOR ACOUSTICAL PANEL CEILING [ACP-4]:

- A. Products: Provide one of the following:
 1. "Suprafine XL, 9/16, Exposed Tee System;" Armstrong World Industries, Inc.
 2. "Centricitee, DXT;" USG Interiors, Inc.
- B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/653M, not less than G30 (Z90) coating designation, with prefinished 9/16-inch-wide metal caps on flanges.
 1. Structural Classification: Heavy-duty system.
 2. Face Design: Flat, Flush.
 3. End Condition of Cross Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
 4. Cap Finish: White.

2.10 METAL SUSPENSION SYSTEM CEILING [OCG-1]:

- A. Products: Subject to compliance with requirements, provide one of the following:
 1. Armstrong World Industries, Inc.; Co-Extruded Clean Room Aluminum, 1-1/2", Exposed Tee System.
 2. USG Interiors, Inc.: No known product.

B. Extruded Aluminum:

1. Structural Classification: Intermediate-duty system.
2. Face Design: Flat, flush.
3. Face Finish: PVC, Custom color to match Casino 3 grid.

2.11 METAL EDGE MOLDINGS AND TRIM:

A. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:

1. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with ASTM B 221 (ASTM B 221M) for Alloy and Temper 6063-T5.
2. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - a. Organic Coating: Thermosetting, primer/topcoat system with a minimum dry film thickness of 0.8 to 1.2 mils (0.02 to 0.03 mm).

2.12 ACOUSTICAL SEALANT:

A. Products: Subject to compliance with requirements, provide one of the following:

1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
 - c. Or equal.
2. Acoustical Sealant for Concealed Joints:
 - a. OSI Sealants, Inc.; Pro-Series SC-175 Rubber Base Sound Sealant.
 - b. Pecora Corporation; BA-98.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.

B. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

- C. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION:

- A. General: Install acoustical panel ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - 1. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- 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. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 4. 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.
 - 5. 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.

6. 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 structure to which hangers are attached and 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.
 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 9. Do not attach hangers to steel deck tabs.
 10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 11. 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.
 12. 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 ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. 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.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 3. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.

4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 FIELD QUALITY CONTROL:

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections and prepare reports:
 1. Suspended ceiling system.
 2. Hangers, anchors and fasteners.
 3. Compliance of seismic design.

- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.

- C. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf (890 N) of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf (1957 N) of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

- D. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING:

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section includes acoustical metal pans and associated suspension system for interior ceilings.
- B. Related Sections include the following:
 - 1. Division 09 Section "Acoustical Panel Ceilings."

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 units with factory-applied finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Pans: Set of 6-inch- (150-mm-) square Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.
 - 3. Sound Absorber: Sample of each type matching size of Sample metal pan.
- E. Delegated-Design Submittal: For design of seismic restraints and attachment devices.

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. Suspended ceiling components.
 - 2. Structural members to which suspension systems will be attached.
 - 3. Size and location of access modules for acoustical panels.
 - 4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - 5. Perimeter moldings.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical metal pan ceiling suspension system and anchor and fastener type.
- 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 Metal Pans: 2 Full-size units.

1.8 QUALITY ASSURANCE:

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.

1.9 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver acoustical metal pans, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints and attachment devices.
- 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: 50 or less.

2.2 ACOUSTICAL METAL PANS, GENERAL:

- A. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 70 percent for metal pans.
- C. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.
- D. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
 - 1. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635/C 635M.
 - a. Painted Finishes: Electrolytic zinc-coated steel complying with ASTM A 879/A 879M, 13Z (40G) coating, surface treatment as recommended by finish manufacturer for type of use and finish indicated.

2.3 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING:

- A. Basis-of-Design Product [AC-(#)]: Subject to compliance with requirements, provide **“MetalWorks Tin;” Armstrong World Industries, Inc.** or comparable product by one of the following:
 - 1. USG Interiors, LLC
 - 2. Chicago Metallic Corporation.
- B. Classification: Units complying with ASTM E 1264 for Type XX, perforated coated steel facing (pan) with mineral- or glass-fiber-base backing.
 - 1. Pattern: Pattern A (perforated, regularly spaced large holes), arranged in diagonal alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as indicated by product designation.
 - a. As standard with manufacturer.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 - 1. Lay-In Pans: Formed to set in exposed suspension grid.
 - 2. Hook-On Pans: Designed to hook in and be securely retained in exposed suspension grid by formed edges.
- D. Pan Thickness: Not less than 0.040 inch.
- E. Pan Edge Detail: Tegular.
- F. Pan Joint Detail: Narrow reveal, not greater than 9/16 inch (15 mm) wide.
- G. Perforations: Extra Microperforated.
 - 1. Pattern Type: Round-Diagonal
 - 2. Hole Size: 0.7mm (.028").
- H. Pan Size: As indicated on Drawings.
 - 1. 24 by 24 inches (610 by 610 mm).
 - 2. Fleece and sound-absorbent pads: #2820; Armstrong World Industries.
- I. Pan Face Finish:
 - 1. **AC-1:** 56008, Copper.
 - 2. **AC-2:** 6661, Copper.
 - 3. **AC-3:** 56008, Steel.
- J. LR: N/A.
- K. NRC: Not less than 0.60.

L. CAC: N/A.

2.4 METAL SUSPENSION SYSTEMS, GENERAL:

- A. Recycled Content of Metal Suspension System: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635/C 635M requirements.
- C. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- D. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635/C 635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to 5 times that imposed by ceiling construction, as determined by testing according to ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - a. Type: Postinstalled expansion anchors.
 - b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - c. Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - d. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.

Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.

- 2. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

2.5 DIRECT-HUNG, STANDARD-GRID, METAL SUSPENSION SYSTEM FOR ACOUSTICAL METAL PAN CEILING [AC-1], [AC-2]:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **“9/16" Suprafine XL; Armstrong World Industries, Inc.**, or comparable product by one of the following:
 - 1. USG Interiors, Inc.
 - 2. Chicago Metallic Corporation.
- B. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements.
- C. Suspension Systems: Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.
- D. Wire Hangers, Braces, and Ties: Provide wire 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 3 times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung will be less than yield stress of wire, but provide not less than 0.135-inch- (3.5-mm-) diameter wire.
- E. Carriers: Factory finished with matte-black baked finish.
 - 1. Main Carriers: Aluminum, not less than 0.240-inch (6.0-mm) rolled sheet, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, complying with ASTM B 209 (ASTM B 209M).
 - 2. Expansion Carriers: Manufacturer's standard carriers allowing for irregularities or other unusual space conditions.
- F. Carrier Splices: Same metal, profile, and finish as indicated for carriers.

2.6 ACOUSTICAL SEALANT:

- 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. Acoustical Sealant for Concealed Joints:
 - a. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - b. Pecora Corporation; AIS-919.
 - c. Tremco, Inc.; Tremco Acoustical Sealant.
 - d. Or equal.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.

2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
3. Acoustical sealant shall have a VOC content of 250 g/L or less.
4. Acoustical sealant shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 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. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

2.8 FINISHES:

- A. Color-Coated Finish: Manufacturer's standard powder-coat baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.

3.3 INSTALLATION:

- A. General: Install acoustical metal pan 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 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 structure to which hangers are attached and hanger type involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 6. When steel framing does not permit installation of hanger rods at spacing required, install carrying channels or other supplemental support for attachment of hanger rods.
 7. Do not attach hangers to steel deck tabs.
 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 9. 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.
 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. 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.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- E. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.

- F. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with installation tolerances according to CISCA's "Metal Ceilings Technical Guidelines."
1. For lay-in, square-edge pans, install pans with edges fully hidden from view by flanges of suspension-system runners and moldings.
 2. For hook-on pans, position pans according to manufacturer's written instructions.
 3. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 4. Fit adjoining units to form flush, tight joints.
 5. Install sound-absorbent pads in perforated metal pans.
- G. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.

3.4 CLEANING:

- A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings, after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 095133

SECTION 096400WOOD FLOORINGPART 1 - GENERAL1.1 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. Factory-finished wood flooring.
- B. Related Sections:
 - 1. Section 033000 "Cast-In-Place Concrete" for moisture mitigation additives to concrete slabs.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.
- C. Samples: For each exposed product and for each color and texture specified, approximately 12 inches (300 mm) long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.
- D. Letter from the flooring manufacturer that the recommended are compatible with the moisture vapor mitigation additive specified in Specification Section 033000 "Cast-In-Place Concrete" or that the flooring installer shall apply topical treatments to make the substrate acceptable to the flooring manufacturer. Costs for any additional treatments shall be included in the flooring installers bid.

1.4 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. Wood Flooring: Equal to 1 percent of amount installed for each type, color, and finish of wood flooring indicated.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
- C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.7 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Composite Wood Products: Products shall be made without urea formaldehyde.
- B. Hardwood Flooring: Comply with NWFA A500 for species, grade, and cut.
 1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.

2.2 FACTORY-FINISHED WOOD FLOORING

- A. Engineered-Wood Flooring (**WF-1**): HPVA EF, complying with requirements for composite wood products.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Oak Flooring; Terra Legno** or comparable product by one of the following:
 - a. Anderson Hardwood Floors.

- b. Armstrong World Industries, Inc.
- c. Bellawood.
- d. Boen Hardwood Flooring Inc.
- e. Bruce Hardwood; Armstrong.
- f. Carlisle Wide Plank Floors.
- g. EcoTimber.
- h. Mannington Mills, Inc.
- i. Nydee Flooring.
- j. Oregon Lumber Company.
- k. Tarkett, Inc.
- l. Wood Flooring International.
- m. Yesteryear Floorworks Company.

- 2. Species: Tannery Oak.
- 3. Grade: Aged character.
- 4. Thickness: 3/4 inch (12 mm).
- 5. Face Width: 7-1/2 (190 mm).
- 6. Length: Manufacturer's standard.
- 7. Finish: French White Oak, to match ST-1.

2.3 ACCESSORY MATERIALS

- A. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.

4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - 1) On floor slabs that have been treated with moisture vapor mitigation additives (refer to Specification Section 033000 "Cast-In-Place Concrete") the moisture vapor mitigation additive manufacturer shall warrant against the failure of the flooring adhesive due to moisture vapor migration failure.
 5. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
 6. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 7. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.3 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."
- B. Engineered-Wood Flooring: Glue-down to concrete slab.

3.4 PROTECTION

- A. Protect installed wood flooring during remainder of construction period.

END OF SECTION 096400

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Resilient wall base.
 - 2. Resilient flooring accessories.
 - 3. Resilient carpet accessories.
 - 4. Resilient stair accessories.
- B. Related Sections include the following:
 - 1. Section 090001 "Schedule of Finishes."
 - 2. Section 096816 "Sheet Carpeting."

1.3 SUBMITTALS:

- A. Product Data: For each type of product specified.
- B. Samples for Initial Selection: Manufacturer's standard sample sets consisting of sections of units showing the full range of colors and patterns available for each type of product indicated.
- C. Samples for Verification: In manufacturer's standard sizes, but not less than 12 inches long, of each product color and pattern specified.
- D. Product Certificates: Signed by manufacturers of resilient wall base and accessories certifying that each product furnished complies with requirements.

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type and color of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
 - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS:

- A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive resilient products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. For resilient products installed on traffic surfaces, close spaces to traffic during installation and for time period after installation recommended in writing by manufacturer.
- D. Coordinate resilient product installation with other construction to minimize possibility of damage and soiling during remainder of construction period. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof, of each different type, color, pattern, and size of resilient product installed.
 - 2. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Resilient Wall Base and Accessory Schedule at the end of Part 3.

2.2 RESILIENT WALL BASE:

- A. Rubber Wall Base: Products complying with FS SS-W-40, Type I and with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.3 RESILIENT STAIR ACCESSORIES:

- A. Rubber Stair Treads: Products of style suitable for use indicated and complying with FS RR-T-650, Composition A and with requirements specified in the Resilient Wall Base and Accessory Schedule.
- B. Risers: Products of same manufacturer as stair treads and complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.4 RESILIENT ACCESSORIES:

- A. Rubber Accessories: Products complying with requirements in the Resilient Wall Base and Accessory Schedule.
- B. Vinyl Accessories: Products complying with requirements specified in the Resilient Wall Base and Accessory Schedule.

2.5 INSTALLATION ACCESSORIES:

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by resilient product 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.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements, including those for maximum moisture content. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. General: Comply with manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before installing resilient products. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 INSTALLATION:

- A. General: Install resilient products according to manufacturer's written installation instructions.
- B. Apply resilient wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
 - 1. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
 - 2. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
 - 3. Do not stretch base during installation.
 - 4. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
 - 5. Install premolded outside and inside corners before installing straight pieces.
- C. Place resilient products so they are butted to adjacent materials and bond to substrates with adhesive. Install reducer strips at edges of flooring that would otherwise be exposed.

3.4 CLEANING AND PROTECTING:

- A. Perform the following operations immediately after installing resilient products:
 - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient

- product manufacturers.
 - 2. Sweep or vacuum horizontal surfaces thoroughly.
 - 3. Do not wash resilient products until after time period recommended by resilient product manufacturer.
 - 4. Damp-mop or sponge resilient products to remove marks and soil.
- B. Apply resilient products to stairs as indicated and according to manufacturer's written installation instructions.
- C. Protect resilient products against mars, marks, indentations, and other 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 resilient product manufacturer.
- 1. Apply protective floor polish to vinyl resilient products installed on floors that are free from soil, visible adhesive, and surface blemishes, if recommended by manufacturer.
 - a. Use commercially available product acceptable to resilient product manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 - 2. Cover resilient products installed on floors with undyed, untreated building paper until inspection for Substantial Completion.
- D. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
- 1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
 - 2. After cleaning, reapply polish on vinyl products on floors to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Owner's maintenance program.

3.5 RESILIENT WALL BASE AND ACCESSORY SCHEDULE:

- A. Rubber Wall Base "**WB-[#]**": Where these designations are indicated, provide rubber wall base complying with the following:
- 1. Manufacturer's: Provide rubber wall base manufactured by **Mannington Commercial**, or equivalent products by one of the following:
 - a. Armstrong World Industries, Inc.
 - b. Nora Systems, Inc.
 - c. Roppe Corporation, USA.
 - d. Johnsonite; A Tarkett Company
 - 2. Style: Cove with top-set toe at linoleum tile and at carpet.
 - 3. Minimum Thickness: C inch.
 - 4. Lengths: Coils in lengths standard with manufacturer, but not less than 96 feet.

5. Outside Corners: Field formed.
 6. Inside Corners: Field formed.
 7. Ends: Field formed.
 8. Surface: Smooth.
 9. Height: 6 inches, unless otherwise noted.
 10. Color and Pattern: Provide the following colors:
 - a. "WB-[#]": See Section 090001 "Schedule of Finishes."
- B. Vinyl Accessory Molding: Where flooring materials change, provide vinyl accessory moldings complying with the following:
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. Burke Mercer Flooring Products, Division of Burke Industries Inc.
 - c. Flexco.
 - d. Johnsonite; A Tarkett Company.
 - e. Musson Rubber Company.
 - f. Roppe Corporation, USA.
 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Resilient to Resilient Tile (1/4" to 1/8") [TS-1]: Model No. **CTA-XX-H**, carpet to resilient tile transition edge for glue-down applications; Johnsonite.
 - b. Carpet to Carpet (3/8" to 1/4") [TS-2]: Model No. **CTA-XX-L**, carpet to resilient tile transition edge for glue-down applications; Johnsonite.
 3. Color: See Section 090001 "Schedule of Finishes."
 4. Profiles and Dimensions: As specified by product designation indicated above.

END OF SECTION 096513

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Enhanced vinyl floor tile.
- B. Related Sections include the following:
 - 1. Section 090001 "Schedule of Finishes."
 - 2. Section 096513 "Resilient Base and Accessories."

1.3 SUBMITTALS:

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

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
- C. Fire-Test-Response Characteristics: Provide products with the following fire-test-response characteristics as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 W/sq. cm or greater when tested per ASTM E 648.
 - 2. Smoke Density: Maximum specific optical density of 450 or less when tested per ASTM E 662.
- D. Static Coefficient of Friction: For resilient tile flooring installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM D 2047:
 - 1. Level Surfaces: Minimum 0.6.

2. Ramp Surfaces: Minimum 0.8.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F.
- C. Store tiles on flat surfaces.
- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.6 PROJECT CONDITIONS:

- A. Maintain a temperature of not less than 70 deg F or more than 95 deg F in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After postinstallation period, maintain a temperature of not less than 55 deg F or more than 95 deg F.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.
- F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

1.7 EXTRA MATERIALS:

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
 2. Resilient Accessories: 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.

3. Deliver extra materials to Owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.
- B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in 090001 "Schedule of Finishes."
 1. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.3 RESILIENT TILE:

- A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements specified in the Resilient Tile Flooring Schedule.
- B. Fire-Test-Response Characteristics:
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm per ASTM E 684.

2.4 LUXURY VINYL FLOOR TILE:

- A. Luxury Vinyl Floor Tile **FT-1**: Where this designation is indicated, provide vinyl composition floor tile complying with the following:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide "**Vivero Better**" by **Armstrong**.
 2. Class: Class 3 (through-pattern tile).
 3. Wearing surface: Type B embossed.
 4. Thickness: 0.080" (2.0 mm).
 5. Size: 6 in. X 48 in. (152.4 mm X 1219.2 mm)
 6. Color and Pattern: Y3040 Bluegrass Barnwood, "Beige Ballad."
- B. Luxury Vinyl Floor Tile **FT-2**: Where this designation is indicated, provide vinyl composition floor tile complying with the following:

1. Basis-of-Design Product: Subject to compliance with requirements, provide “**Natural Creations Diamond 10 Technology ArborArt**” by **Armstrong**.
 2. Class: Class 3 (through-pattern tile).
 3. Wearing surface: Type B embossed.
 4. Thickness: 0.125" (3.2 mm).
 5. Size: 6 in. X 48 in. (152.4 mm X 1219.2 mm)
 6. Color and Pattern: NA181, “Galena Oak Wheat.”
- C. Luxury Vinyl Floor Tile **FT-3**: Where this designation is indicated, provide vinyl composition floor tile complying with the following:
1. Basis-of-Design Product: Subject to compliance with requirements, provide “**Natural Creations Classics**” by **Armstrong**.
 2. Class: Class 3 (through-pattern tile).
 3. Wearing surface: Type B embossed.
 4. Thickness: 0.125" (3.2 mm).
 5. Size: 9 in. X 48 in. (228.6 mm X 1219.2 mm)
 6. Color and Pattern: TP053, “Bleach Blonde.”
- D. Luxury Vinyl Floor Tile **FT-4**: Where this designation is indicated, provide vinyl composition floor tile complying with the following:
1. Basis-of-Design Product: Subject to compliance with requirements, provide “**Natural Creations Diamond 10 Technology ArborArt**” by **Armstrong**.
 2. Class: Class 3 (through-pattern tile).
 3. Wearing surface: Type B embossed.
 4. Thickness: 0.125" (3.2 mm).
 5. Size: 4 in. X 48 in. (101.6 mm X 914.4 mm)
 6. Color and Pattern: NA195, Avilla Oak “Baltic Black.”

2.5 STATIC DISSIPATIVE FLOOR TILE (FT-5)

- A. Refer to Specification Section 096536 “Static Dissipative Resilient Flooring.”

2.6 VINYL COMPOSITION FLOOR TILE (FT-6)

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
- B. Tile Standard: ASTM F 1066, “Standard Specification Vinyl Composition Floor Tile”.
1. Class: Class 2, through-pattern.
 2. Type: B, embossed surface.
- C. Thickness: 0.125 inch(3.0 mm).
- D. Size: 12 by 12 inches(305 by 305 mm).

- E. Installation Method: Full spread adhesive.
- F. Colors and Patterns: As selected by Architect, “Washed Linen,” Standard Excelon, Imperial Texture;” Armstrong Flooring, Inc.

2.7 INSTALLATION ACCESSORIES:

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring 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. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
 - 2. Adhesives shall be moisture resistant up to 90 percent relative humidity.

PART 3 - EXECUTION:

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Owner will test for moisture-vapor emissions by independent tester, and subcontractor will accept results. Proceed with installation only after substrates pass testing.
 - a. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 90% relative humidity level measurement.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
 - 1. Preparation of all existing concrete floors with trowelable leveling and patching compound is required.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.3 TILE INSTALLATION:

- A. General: Comply with tile manufacturer's written installation instructions.
- B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
 - 1. Lay tiles square with room axis, unless otherwise indicated.
 - 2. Pattern: Monolithic or linear.
- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles 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 finish flooring as marked on subfloor. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.

3.4 CLEANING AND PROTECTING:

- A. Perform the following operations immediately after installing resilient products:
 - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
 - 2. Sweep or vacuum floor thoroughly.
 - 3. Do not wash floor until after time period recommended by flooring manufacturer.
 - 4. Damp-mop floor to remove marks and soil.

- B. Protect flooring against mars, marks, indentations, and other 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 flooring manufacturer.
 - 1. Vinyl Composition Floor Tile: Apply **2 coats** of sealer and **3 coats** of protective floor polish to vinyl composition tile products installed on floors that are free from soil, visible adhesive, and surface blemishes, recommended by manufacturer.
 - a. Use commercially available product acceptable to resilient product manufacturer.
 - b. Coordinate selection of floor polish with Owner's maintenance service.
 - 2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
 - 3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

- C. Clean resilient products not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.
 - 1. Before cleaning, strip protective floor polish that was applied to vinyl products on floors after completing installation only if required to restore polish finish and if recommended by resilient product manufacturer.
 - 2. After cleaning, reapply polish on vinyl products on floors to restore protective floor finish according to resilient product manufacturer's written recommendations. Coordinate with Owner's maintenance program.

END OF SECTION 096519

SECTION 096536STATIC-CONTROL RESILIENT FLOORINGPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Static-dissipative, vinyl composition floor tile.

- B. Related Requirements:

- 1. Section 033000 "Cast-In-Place Concrete" for moisture mitigation additives to concrete slabs.
- 2. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with static-control resilient flooring.

1.3 PREINSTALLATION MEETINGS

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

- 1. Review methods and procedures related to static-control resilient flooring including, but not limited to, the following:
 - a. Examination and preparation of substrates to receive static-control resilient flooring.
 - b. Installation.

1.4 ACTION SUBMITTALS

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

- B. Shop Drawings: For each type of static-control resilient flooring. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 1. Show details of special patterns.
- 2. Show locations of inscribed maintenance tiles.
- 3. Submit grounding diagram showing location of grounding strips and connections.

- C. Samples for Verification: For each type of static-control resilient flooring, of size indicated below:

- 1. Floor Tile: Full-size units.

- D. Product Schedule: For static-control resilient flooring. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for static-control resilient flooring.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of static-control resilient flooring to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for static-control resilient flooring.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- 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 mockups for static-control resilient flooring including resilient base and accessories.
 - a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations directed by Architect.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store static-control resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C).
 - 1. Floor Tile: Store on flat surfaces.

1.10 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 85 deg F (29 deg C), in spaces to receive static-control resilient flooring during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.

- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during static-control resilient flooring installation.
- D. Close spaces to traffic for 48 hours after static-control resilient flooring installation.
- E. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Static-Dissipative Properties: Provide static-control resilient flooring with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
 - 1. Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage.
 - a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
 - b. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
 - 2. Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
 - 3. Static Decay: 5000 to zero V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Static-Dissipative, Vinyl Composition Floor Tile (**FT-5**): ASTM F 1066 (vinyl composition floor tile, nonasbestos formulated), Class 2 (through-pattern tile).
 - 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. Armstrong World Industries, Inc; Static Dissipative SDT.
 - 2. Thickness: Not less than 0.125 inch (3.2 mm).
 - 3. Size: 12 by 12 inches (305 by 305 mm).
 - 4. Colors and Patterns: #51951, "Armor Gray."

2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified portland cement or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
- C. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.
- D. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor-covering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion or static-control characteristics of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions and with oversight by manufacturer's representative to ensure adhesion of static-control resilient flooring and electrical continuity of floor-covering systems.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with floor-covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test according to 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. Perform relative-humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative-humidity level measurement.

- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install static-control resilient flooring until it is same temperature as space where it is to be installed.
 - 1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

3.3 INSTALLATION, GENERAL

- A. Install static-control resilient flooring according to manufacturer's written instructions and with oversight by manufacturer's representative.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.
- C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install static-control resilient flooring on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of static-control resilient flooring installed on covers. Tightly adhere static-control resilient flooring edges to substrates that abut covers and to cover perimeters.
- G. Adhere static-control resilient flooring to substrates using a full spread of static-control adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 FLOOR-TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
 - 1. Lay floor tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 - 1. Lay static-dissipative, vinyl composition floor tiles in pattern of colors and sizes indicated.

3.5 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.
 - 1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.
 - 2. Arrange for testing of static-control resilient flooring before **and** after performing floor polish procedures.
- B. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of static-control resilient flooring.
- B. Perform the following operations immediately after completing static-control resilient flooring:
 - 1. Remove static-control adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect static-control resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 - 1. Do not wax static-control resilient flooring.
 - 2. If recommended in writing by manufacturer, apply protective static-control floor polish formulated to maintain or enhance floor covering's electrical properties; ensure static-control resilient flooring surfaces are free from soil, static-control adhesive, and surface blemishes.
 - a. Verify that both floor polish and its application method are approved by manufacturer and that floor polish will not leave an insulating film that reduces static-control resilient flooring's effectiveness for static control.
- D. Cover static-control resilient flooring until Substantial Completion.

END OF SECTION 096536

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. High-performance resinous flooring.
- B. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for concrete substrates to receive resinous flooring.
 - 2. Section 090001 "Schedule of Finishes."

1.3 SUBMITTALS:

- A. Product Data: For each type of product specified. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors, textures, and patterns available for each resinous flooring system indicated.
- C. Samples for Verification: Of each resinous flooring system required, 6 inches square, applied by Installer for this Project to a rigid backing, in color, texture, and finish indicated. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
- D. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.
- E. Material Test Reports: From a qualified independent testing agency indicating and interpreting test results of the resinous flooring's reaction to chemicals and other reagents and substantiating compliance with requirements.
- F. Material Certificates: In lieu of material test reports, when permitted by Architect, signed by manufacturers certifying that materials furnished comply with requirements.
- G. Maintenance Data: For resinous flooring to include in the maintenance manuals specified in Division 1.

1.4 QUALITY ASSURANCE:

- A. Installer Qualifications: Engage an experienced installer (applicator) who has specialized in installing resinous flooring similar in material, design, and extent to that indicated for this Project and who is acceptable to resinous flooring manufacturer.
 - 1. Engage an installer who employs only persons trained and approved by resinous flooring manufacturer for installing resinous flooring systems specified.
 - 2. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to install resinous flooring systems specified.
- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, and sealing or finish coats, through one source from a single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.6 PROJECT CONDITIONS:

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products indicated for each designation in the Resinous Flooring Schedule at the end of Part 3.

2.2 MATERIALS:

- A. VOC Content of Resinous Flooring: Provide resinous flooring systems, for use inside the weatherproofing system, that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Resinous Flooring: 100 g/L.
- B. Resinous Flooring: Resinous floor surfacing system consisting of primer; body coat(s) including resin, hardener, aggregates, and colorants, if any; and sealing or finish coat(s). Comply with requirements indicated in the Resinous Flooring Schedule.
- C. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- D. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated.

PART 3 - EXECUTION

3.1 PREPARATION:

- A. General: Prepare and clean substrate according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Comply with ASTM C 811 requirements, unless manufacturer's written instructions are more stringent.
 - 2. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - 3. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 - 4. Moisture Testing: Owner will test for moisture-vapor emissions by independent tester, and subcontractor will accept results.
 - a. Perform 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.
 - 5. Alkalinity and Adhesion Testing: Verify that concrete substrates have pH within acceptable range. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.

- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations.

3.2 APPLICATION:

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
 - 1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate and optimum intercoat adhesion.
 - 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply self-leveling slurry body coat(s) in thickness indicated.
 - 1. Broadcast aggregates and, after resin is cured, remove excess aggregates to provide surface texture indicated.
- D. Apply troweled or screeded body coat(s) in thickness indicated. Hand or power trowel and grout to fill voids. When cured, sand to remove trowel marks and roughness.
- E. Integral Cove Base: Apply cove base mix to wall surfaces at locations indicated. Round internal and external corners. Install cove base according to manufacturer's written instructions and details including taping, mixing, priming, troweling, sanding, and topcoating of cove base.
- F. Apply sealing or finish coat(s), including grout coat, if any, of type recommended by resinous flooring manufacturer to produce finish indicated. Apply in number of coats and at spreading rates recommended in writing by manufacturer.

3.3 FIELD QUALITY CONTROL:

- A. Core Sampling: At the direction of Owner and at locations designated by Owner, take 1 core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take 2 additional samples. Repair damage caused by coring and correct deficiencies at no additional cost to Owner.

- B. Material Sampling: Owner may at any time and any number of times during flooring application require material samples for testing for compliance with requirements.
 - 1. Owner will engage an independent testing agency to take samples of materials being used. Material samples will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. Testing agency will test samples for compliance with requirements, using applicable referenced testing procedures or, if not referenced, using testing procedures listed in manufacturer's Product Data.
 - 3. If test results show installed materials do not comply with specified requirements, pay for testing, remove noncomplying materials, prepare surfaces coated with unacceptable materials, and reapply flooring materials to comply with requirements.

3.4 CLEANING AND PROTECTING:

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.
- B. Clean resinous flooring not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each Project area. Use cleaning materials and procedures recommended in writing by resinous flooring manufacturer.

3.5 RESINOUS FLOORING SCHEDULE

- A. Resinous Flooring "**RF-1**", "**RF-2**", "**RF-3**": Provide resinous flooring system complying with the following:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Stontec ERF; Stonhard, Inc., USA.**, or a comparable product by one of the following:
 - a. Dur-A-Flex Inc
 - b. General Polymers.
 - c. Dex-O-Tex, Division of Crossfield Products, Inc.
 - d. Sika Corp., Industrial Flooring.
 - e. Tennant Company-Architectural Coatings
 - 2. System Characteristics: A three-component, high solids, epoxy undercoat consisting of resin, curing agent and filler
 - 3. Color and Pattern:
 - a. **RF-[1]**: See Section 090001 "Schedule of Finishes." As selected by Architect.
 - b. **RF-[2]**: See Section 090001 "Schedule of Finishes." As selected by Architect.
 - c. **RF-[3]**: See Section 090001 "Schedule of Finishes." As selected by Architect.
 - 4. Total Thickness of Base and Body Coat(s): Nominal 2 mm flake broadcast flooring system.
 - 5. Wearing Surface: Antislip.
 - 6. Base: 4 inch- high integral cove base.

7. Components: Provide manufacturer's standard components complying with requirements, unless otherwise indicated. Provide the following optional components:
 - a. Primer.
 - b. Quartz non-slip aggregate surfacing.
 - c. Undercoat.
 - d. Brightly colored flakes.
8. Physical Properties: As indicated by system designation and components indicated above.
9. Chemical Resistance: As indicated by system designation and components indicated above.

END OF SECTION 096723

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. This Section includes modular, carpet tile.
- B. Related Sections include the following:
 - 1. Division 09 Section "Sheet Carpeting" for broadloom carpeting.
 - 2. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Shop Drawings: Show the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Existing flooring materials to be removed.
 - 3. Existing flooring materials to remain.
 - 4. Carpet tile type, color, and dye lot.
 - 5. Type of subfloor.
 - 6. Type of installation.
 - 7. Pattern of installation.
 - 8. Pattern type, location, and direction.
 - 9. Pile direction.
 - 10. Type, color, and location of insets and borders.
 - 11. Type, color, and location of edge, transition, and other accessory strips.
 - 12. Transition details to other flooring materials.
- C. 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.
- D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- E. Qualification Data: For Installer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency.

- G. 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.
- H. Warranty: Special warranty specified in this Section.
- I. Industry Standards: Provide three (3) copies of the "Standard for Installation Specification of Commercial Carpet - CRI 104."

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- C. Mockups: Before installing carpet tile, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

1.6 PROJECT CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.

2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge,] and delamination.
3. Warranty Period: 10 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

PART 2 - PRODUCTS

2.1 CARPET TILE (CPT-[#])

- A. Reference Section 090001 - "Schedule of Finishes."

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 complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 1. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. For painted subfloors, verify the following:
 1. Perform bond test recommended in writing by adhesive manufacturer.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
- D. Clean metal substrates of grease, oil, soil and rust, and prime if directed 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 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
- H. 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, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - 2. Remove yarns that protrude from carpet tile surface.
 - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."

- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 096900ACCESS FLOORINGPART 1 - GENERAL1.1 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. Access-flooring panels.
 - 2. Understructure.
- B. Related Requirements:
 - 1. Section 030130 "Maintenance of Cast-In-Place Concrete" for concrete slab sealers.

1.3 COORDINATION

- A. Seal concrete prior to installation of electrical, mechanical or access flooring work.
- B. Coordinate location of mechanical and electrical work in underfloor cavity to prevent interference with access-flooring pedestals.
- C. Mark pedestal locations on subfloor using a grid to enable mechanical and electrical work to proceed without interfering with access-flooring pedestals.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review connection with mechanical and electrical systems.
 - 2. Review requirements related to sealing the plenum.
 - 3. Review procedures for keeping underfloor space clean.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include layout of access-flooring system and relationship to adjoining Work based on field-verified dimensions.
 - 1. Details and sections with descriptive notes indicating materials, finishes, fasteners, typical and special edge conditions, accessories, and understructures.
- C. Samples for Verification: For the following products:
 - 1. Exposed Metal Accessories: Approximately 10 inches (250 mm) in length.
 - 2. One complete full-size floor panel, pedestal, and understructure unit for each type of access-flooring system required.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of access-flooring system.
- C. Product Test Reports: For each type of flooring material and exposed finish, for tests performed by a qualified testing agency.
- D. Seismic Design Calculations: For seismic design of access-flooring systems including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Preconstruction Test Reports: For preconstruction adhesive field test.

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. Flooring Panels: 25 units.
 - 2. Pedestals: 100.
 - 3. Stringers: 100.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of typical access-flooring assembly as shown on Drawings. Size to be an area no fewer than five floor panels in length by five floor panels in width.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups.
 - 1. Use personnel, materials, and methods of construction that will be used at Project site.
 - 2. Notify Architect seven days in advance of the dates and times when laboratory mockups will be tested.
- B. Preconstruction Adhesive Field Test: Before installing pedestals, field test their adhesion to subfloor surfaces by doing the following:
 - 1. In areas representative of each subfloor surface, set typical pedestal assemblies in same adhesive and use methods required for the completed Work.

2. Allow test installation to cure for manufacturer's recommended cure time, with a pressure of 25 lbf (111 N) applied vertically to pedestals during this period.
3. After curing, apply lateral load against a straight steel bar inserted 2 inches (51 mm) into pedestal stems. Measure the force needed to cause adhesive failure of pedestal base.
4. Remove and discard failed pedestals, and clean pedestals of adhered residue.
5. Proceed with installation only after tests show compliance with performance requirement specified for pedestals' capability to resist overturning moment.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install access flooring until spaces are enclosed, subfloor has been sealed, ambient temperature is between 50 and 90 deg F (10 and 32 deg C), and relative humidity is not less than 20 and not more than 70 percent.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Access flooring shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Structural Performance: Provide access-flooring systems capable of complying with the following performance requirements according to testing procedures in Cisca's "Recommended Test Procedures for Access Floors":
 1. Access Flooring System (**AF-1**):
 - a. Concentrated Loads: 2500 lbf (11,121 N) with the following deflection and permanent set:
 - 1) Top-Surface Deflection: 0.10 inch (2.54 mm).
 - 2) Permanent Set: 0.010 inch (0.25 mm).
 - b. Ultimate Loads: 5000 lbf (2268 kg).
 - c. Rolling Loads: With local or overall deformation not to exceed 0.040 inch (1.02 mm).
 - d. Cisca Wheel 1: 10 passes at 2000 lbf.
 - e. Cisca Wheel 2: 10,000 passes at 2000 lbf.
 - f. Pedestal Axial Load Test: 6000 lbf (26 690 N).
 - g. Stringer Load Test: 450 lbs. at center of span with a permanent set not to exceed 0.010 inch (0.25 mm).
 - h. Pedestal Overturning Moment Test: 1000 lbf x inches (113 N x meters).
 - i. Drop Impact Load Test: 200 lbs.
- C. Fire Performance:
 1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 or less.
 2. Combustion Characteristics: ASTM E 136.

2.2 MANUFACTURERS

- A. Source Limitations: Obtain access-flooring system from single source from single manufacturer.

2.3 FLOOR PANELS

- A. Floor Panels, General: Provide modular panels interchangeable with other field panels without disturbing adjacent panels or understructure.
 - 1. Size: Nominal 24 by 24 inches (610 by 610 mm).
 - 2. Attachment to Understructure: Bolted.
 - 3. One-to-One Carpet Tile: Fabricate panels to accept one-to-one carpet tile.
- B. Cementitious-Core Steel Panels (**AF-1**): Fabricated from cold-rolled steel sheet, with the die-cut flat top sheet and die-formed and stiffened bottom pan welded together, and with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish. Fully grout internal spaces of completed units with manufacturer's standard cementitious fill.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide ConCore 2500; Tate Access Floors, Inc or comparable product by one of the following:
 - a. ASM Modular Systems, Inc.
 - b. Bergvik North America, Inc.
 - c. Camino Modular Systems, Inc.
 - d. Computer Environments, Inc.
 - e. Haworth, Inc.

2.4 UNDERSTRUCTURE

- A. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel.
 - 1. Provide pedestals designed for use in seismic applications.
 - 2. Base: Square or circular base with not less than 16 sq. in. (103 sq. cm) of bearing area.
 - 3. Column: Of height required to bring finished floor to elevations indicated. Weld to base plate.
 - 4. Provide vibration-proof leveling mechanism for making and holding fine adjustments in height over a range of not less than 2 inches (51 mm) and for locking at a selected height, so deliberate action is required to change height setting and prevent vibratory displacement.
 - 5. Head: Designed to support the panel system indicated.
- B. Stringer Systems: Modular steel stringer systems designed to bolt to pedestal heads and form a grid pattern. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.
 - 1. Continuous Gaskets: At contact surfaces between panel and stringers to deaden sound, seal off the underfloor cavity from above, and maintain panel alignment and position.

2.5 FABRICATION

- A. Fabrication Tolerances:
 - 1. Size: Plus or minus 0.020 inch (0.50 mm) of required size.

2. Squareness: Plus or minus 0.015 inch (0.38 mm) between diagonal measurements across top of panel.
 3. Flatness: Plus or minus 0.035 inch (0.89 mm), measured on a diagonal on top of panel.
- B. Panel Markings: Clearly and permanently mark floor panels on their underside with panel type and concentrated-load rating.
- C. Bolted Panels: Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
1. Captive Fasteners: Provide fasteners held captive to panels.
- D. Cutouts: Fabricate cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with structural performance requirements.
1. Number, Size, Shape, and Location: As indicated.
 2. Grommets: Where indicated, fit cutouts with manufacturer's standard grommets; or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding with tapered top flange. Furnish removable covers for grommets.
 3. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.

2.6 ACCESSORIES

- A. Adhesives: Manufacturer's standard adhesive for bonding pedestal bases to subfloor.
1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Plenum-Wall Brush Grommets: Self-sealing cable brush grommet with 4-by-13-inch (102-by-330-mm) rectangular usable area for passage of power and signal cables through plenum walls. Frame of ABS plastic with passageway consists of intermediate layer of flexible EPDM rubber and interwoven nylon filaments. Provide units with plastic cable tray for support of cables and protection of wallboard.
- C. Cavity Dividers: Provide manufacturer's standard metal dividers located where indicated to divide underfloor cavities.
- D. Closures: Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal-closure plates with manufacturer's standard finish.
- E. Ramps: Manufacturer's standard ramp construction of width and slope indicated, but not steeper than 1:12, with raised-disc or textured rubber or vinyl-tile floor coverings, and of same materials, performance, and construction requirements as access flooring.
- F. Railings: Standard extruded-aluminum railings at ramps and open-sided perimeter of access flooring where indicated. Include handrail, intermediate rails, posts, brackets, end caps, wall returns, wall and floor flanges, plates, and anchorages where required.
1. Provide railings that comply with structural performance requirements specified in Section 055213 "Pipe and Tube Railings."
- G. Panel Lifting Device: Panel manufacturer's standard portable lifting device for each type of panel required for each computer room.

- H. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer and manufacturer's representative present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, foreign deposits, and debris that might interfere with attachment of pedestals.
 - 2. Verify that concrete floor sealer and finish have been applied and cured.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than 6 inches (152 mm).
- B. Locate each pedestal, complete any necessary subfloor preparation, and vacuum subfloor to remove dust, dirt, and construction debris before beginning installation.

3.3 INSTALLATION

- A. Install access-flooring system and accessories under supervision of access-flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
- B. Adhesive Attachment of Pedestals: Set pedestals in adhesive, according to access-flooring manufacturer's written instructions, to provide full bearing of pedestal base on subfloor.
- C. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.
- D. Stringer Systems: Secure stringers to pedestal heads according to access-flooring manufacturer's written instructions.
- E. Install flooring panels securely in place, properly seated with panel edges flush. Do not force panels into place.
- F. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than 1/8 inch (3 mm) where panels abut vertical surfaces.
- G. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under already-installed access flooring.
- H. Underfloor Dividers: Scribe and install underfloor-cavity dividers to closely fit against subfloor surfaces, and seal with mastic.

- I. Closures: Scribe closures to closely fit against subfloor and adjacent finished-floor surfaces. Set in mastic and seal to maintain plenum effect within underfloor cavity.
- J. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area as installation of floor panels proceeds.
- K. Seal underfloor air cavities at construction seams, penetrations, and perimeter to control air leakage, according to manufacturer's written instructions.
- L. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 - 1. Plus or minus 1/16 inch (1.5 mm) in any 10-foot (3-m) distance.
 - 2. Plus or minus 1/8 inch (3 mm) from a level plane over entire access-flooring area.

3.4 PROTECTION

- A. Prohibit traffic on access flooring for 24 hours and removal of floor panels for 72 hours after installation to allow pedestal adhesive to set.
- B. After completing installation, vacuum access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Substantial Completion.
- C. Replace access-flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

END OF SECTION 096900

SECTION 097200WALL COVERINGS

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes installation of the following:
 - 1. Vinyl wall coverings.
- B. Wall coverings purchased by Owner.
- C. Related Sections include the following:
 - 1. Section 090001 "Schedule of Finishes."
 - 2. Division 09 Section "Painting" for priming wall surfaces.

1.3 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include data on physical characteristics, durability, fade resistance, and flame-resistance characteristics.
- B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.
- C. Samples for Initial Selection: For each type of wall covering indicated.
- D. Samples for Verification: Full width by 36-inch- long section of wall covering from dye lot to be used for each type of wall covering indicated for each color, texture, and pattern required.
 - 1. Show complete pattern repeat.
 - 2. Mark top and face of material.
- E. Schedule: For wall coverings. Use same designations indicated on Drawings.
- F. Maintenance Data: For wall coverings to include in maintenance manuals.

1.4 QUALITY ASSURANCE:

- A. Fire-Test-Response Characteristics: Provide wall coverings and adhesives with the following fire-test-response characteristics as determined by testing identical products applied with identical adhesives to substrates per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate appearance and aesthetic effects and set quality standards for installation.
 - 1. Provide a mockup for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 PROJECT CONDITIONS:

- A. Environmental Limitations: Do not install wall coverings 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.
- B. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.6 EXTRA MATERIALS:

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Rolls of Wall-Covering Material: Full-size units equal to 5 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 WALL COVERINGS:

- A. General: Provide rolls of each type of wall covering from same print run or dye lot.

2.2 WALL-COVERING SCHEDULE:

- A. **WC-[#]**: See Section 090001 "Schedule of Finishes."

2.3 ACCESSORIES:

- A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall-covering manufacturer.
- B. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 9 Section "Painting" and recommended in writing by wall-covering manufacturer for intended substrate.
- C. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.
- D. Seam Tape: As recommended in writing by wall-covering manufacturer.
- E. Metal Primer: Interior ferrous metal primer complying with Division 9 Section "Painting."
- F. Adhesives for Attaching Acoustical Glass-Fiber Board to Drywall: As recommended by insulation manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- G. Adhesives for Attaching Fabric Wall Covering to Acoustical Glass-Fiber Board: As recommended by wall covering manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Comply with manufacturer's written instructions for surface preparation.

- B. Clean substrates of substances that could impair wall covering's bond, including mold, mildew, oil, grease, incompatible primers, dirt, and dust.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - 1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
 - 2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity.
 - 3. Metals: If not factory primed, clean and apply metal primer.
 - 4. Gypsum Board: Prime with primer recommended by wall-covering manufacturer.
 - 5. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finishes with fine sandpaper.
- E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.
- G. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.

3.3 INSTALLATION:

- A. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
- D. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.
- E. Match pattern 72 inches above the finish floor.
- F. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
- H. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.

3.4 INSTALLATION OF SOUND ABSORBING UNITS:

- A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations. Wrap edges of fiberglass insulation with fabric.
- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level fabric pattern and grain among adjacent units.

3.5 CLEANING:

- A. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097200

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes surface preparation and field painting of the following:
 - 1. Exposed interior and exterior items and surfaces.
 - 2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
 - 1. Painting includes field painting of exposed bare and covered pipes and ducts, hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. New metal lockers.
 - b. Elevator entrance doors and frames.
 - c. Elevator equipment.
 - d. Finished mechanical and electrical equipment.
 - e. Light fixtures.
 - f. Distribution cabinets.
 - g. Switchgear.
 - h. Panelboards.
 - i. Motors and mechanical equipment.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Foundation spaces.
 - b. Furred areas.
 - c. Ceiling plenums.
 - d. Utility tunnels.

- e. Pipe spaces.
 - f. Duct shafts.
 - g. Elevator shafts.
3. Finished metal surfaces include the following:
- a. Anodized aluminum.
 - b. Stainless steel.
 - c. Chromium plate.
 - d. Copper.
 - e. Bronze and brass.
4. Operating parts include moving parts of operating equipment and the following:
- a. Valve and damper operators.
 - b. Linkages.
 - c. Sensing devices.
 - d. Motor and fan shafts.
5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
- 1. Division 05 Section "Metal Fabrications" for shop priming ferrous metal.
 - 2. Division 08 Section "Hollow Metal Doors and Frames" for shop priming steel doors and frames.
 - 3. Section 090001 "Schedule of Finishes."
 - 4. Division 09 Section "Gypsum Board" for surface preparation for gypsum board.

1.3 DEFINITIONS:

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
 - 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
 - 5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS:

- A. Product Data: For each paint system specified. Include block fillers and primers.
 - 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 - 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 - 1. After color selection, the Architect will furnish color chips for surfaces to be coated.

- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 - 1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
 - 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
 - 3. Submit Samples on the following substrates for the Architect's review of color and texture only:
 - a. Concrete: Provide two 4-inch- square samples for each color and finish.
 - b. Concrete Masonry: Provide two 4-by-8-inch samples of masonry, with mortar joint in the center, for each finish and color.
 - c. Painted Wood: Provide two 12-inch- square samples of each color and material on hardboard.
 - d. Ferrous Metal: Provide two 4-inch- square samples of flat metal and two 8-inch- long samples of solid metal for each color and finish.

- D. Qualification Data: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE:

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
 - 1. Product name or title of material.
 - 2. Product description (generic classification or binder type).
 - 3. Manufacturer's stock number and date of manufacture.
 - 4. Contents by volume, for pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
 - 8. VOC content.

- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS:

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
 - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.

- B. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
1. Glidden Professional (GP).
 2. Benjamin Moore & Co. (Moore).
 3. PPG Industries, Inc. (PPG).
 4. Pratt & Lambert, Inc. (P & L)
 5. Sherwin-Williams Co. (S-W).
 6. California Paints (CP).
 7. MDC Wallcoverings (MDC).

2.2 PAINT MATERIALS, GENERAL:

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 50 g/L.
 2. Nonflat Paints and Coatings: 150 g/L.
 3. Dry-Fog Coatings: 400 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
 7. Pretreatment Wash Primers: 420 g/L.
 8. Floor Coatings: 100 g/L.
 9. Shellacs, Clear: 730 g/L.
 10. Shellacs, Pigmented: 550 g/L.

- D. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - l. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.
- E. Colors: Provide the following color selections:

1. **P-[#]: Reference Section 090001 “Schedule of Finishes.”**
2. **EP-[#]: Epoxy paint. Reference Section 090001 “Schedule of Finishes.”**

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
 - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
 - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
 - 1. Notify the Architect about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION:

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
 - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
 - 1. Provide barrier coats over incompatible primers or remove and reprime.
 - 2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
 - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.

- b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.
 - 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
 - a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
 - b. Painting Existing Metal Lockers: Surfaces must be clean and dry, and free of dust, grease, oil, silicones, wax and rust. Sand glossy and chipped areas with 400-grit abrasive paper. Wipe clean using detergent solutions or high quality lacquer thinner as recommended by paint manufacturer. Prime bare metal with scheduled primer.
 - 4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
 - 1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - 2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION:

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
 - 1. Paint colors, surface treatments, and finishes are indicated in the schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.

4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
 2. Omit primer on metal surfaces that have been shop primed and touchup painted.
 3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
 4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.
- C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
 2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms (electrical, mechanical and data) and in occupied spaces.

- F. Mechanical items to be painted include, but are not limited to, the following:
 - 1. Piping, pipe hangers, and supports.
 - 2. Heat exchangers.
 - 3. Tanks.
 - 4. Ductwork.
 - 5. Insulation.
 - 6. Accessory items.

- G. Electrical items to be painted include, but are not limited to, the following:
 - 1. Conduit and fittings.

- H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

- K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
 - 1. Provide satin finish for final coats.

- L. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

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:

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION:

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
 - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE:

- A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.
 - 1. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a rust-inhibitive primer.
 - a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.
 - 1) GP: 4160 XXXX Devguard Multi-Purpose Tank and Structural Primer.
 - 2) Moore: IronClad Retardo Rust-Inhibitive Paint #163.
 - 3) PPG: Industrial Rust Inhibitive Steel Primer, Series 7-858.
 - 4) P & L: S 4551 Tech-Gard High Performance Rust-Inhibitor Primer.
 - 5) S-W: Kem Bond High Solids Universal Metal Primer.
 - 6) CP: Everlife Alkyd Red Oxide Metal Primer 22150.
 - b. First and Second Coats: Full-gloss, exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 3.0 mils.
 - 1) GP: 4308 XXXX Devguard Alkyd Industrial Gloss Enamel.
 - 2) Moore: Impervo Enamel #133.
 - 3) PPG: Industrial Interior/Exterior Gloss Oil Enamel, Series 7-814.
 - 4) P & L: S 4500 Series Tech-Gard Maintenance Gloss Enamel.

- 5) S-W: Industrial Enamel HS.
 - 6) CP: Everlife Urethane Alkyd Enamel 221XX.
- B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:
- 1. Full-Gloss, Alkyd-Enamel Finish: 2 finish coats over a galvanized metal primer.
 - a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) GP: 4160 XXXX Devguard Multi-Purpose Tank & Structural Primer.
 - 2) Moore: IronClad Galvanized Metal Latex Primer #155.
 - 3) PPG: Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel, Series 90-709/712.
 - 4) P & L: Z/F 1003 Suprime "3" Interior/Exterior Latex Metal Primer.
 - 5) S-W: Galvite HS.
 - 6) CP: Rust Stop Metal Primer/Finish DTM 106X.
 - b. First and Second Coats: Full-gloss, exterior, alkyd enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.
 - 1) GP: 4308 XXXX Devguard Alkyd Industrial Gloss Enamel.
 - 2) Moore: Impervo Enamel #133.
 - 3) PPG: Industrial Interior/Exterior Gloss-Oil Enamel, Series 7-814.
 - 4) P & L: S 4500 Series Tech-Gard Maintenance Gloss Enamel.
 - 5) S-W: Industrial Enamel HS.
 - 6) CP: Everlife Urethane Alkyd Enamel 221XX.

3.8 INTERIOR PAINT SCHEDULE:

- A. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
 - 1. Flat Acrylic Finish (Ceilings and soffits in dry areas - typical): 2 finish coats over a primer.
 - a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
 - 1) GP: Lifemaster No VOC Interior Primer 9116-1200.
 - 2) Moore: Fresh Start All-Purpose 100 percent Acrylic Primer 023.
 - 3) PPG: Speedhide Quick-Drying Interior Latex Sealer, Series 6-2.
 - 4) P & L: PRO-HIDE® Gold Interior Low Odor Latex Primer
 - 5) S-W: ProMar 200 Interior Latex Primer, B28W8200.

- 6) CP: Primer – Prime Choice All Surface 100% Acrylic Enamel Undercoater 50300.
- b. First and Second Coats: Flat, acrylic-latex-based, interior paint applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.5 mils.
- 1) GP: 1210 XXXX Ultra-Hide Latex Flat Interior Wall Paint.
 - 2) Moore: Regal Wall Satin W215.
 - 3) PPG: Speedhide Interior Wall Flat Latex, Series 6-70.
 - 4) P & L: RedSeal Porcelain Interior Acrylic Latex Wall Coating.
 - 5) S-W: ProMar 200 Flat, B30W200 Series.
 - 6) CP: Fres~Coat Acrylic Flat 533XX.
2. Low-Luster, Acrylic-Enamel Finish [walls]: 2 finish coats over a primer.
- a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
- 1) GP: Lifemaster No VOC Interior Primer 9116-1200.
 - 2) Moore: Fresh Start All-Purpose 100 percent Acrylic Primer 023.
 - 3) PPG: Speedhide Quick-Drying Interior Latex Sealer, Series 6-2.
 - 4) P & L: PRO-HIDE® Gold Interior Low Odor Latex Primer
 - 5) S-W: ProMar 200 Interior Latex Primer, B28W8200..
 - 6) CP: Primer – Prime Choice All Surface 100% Acrylic Enamel Undercoater 50300.
- b. First and Second Coats: Low-luster (eggshell or satin), acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.8 mils.
- 1) GP: 1412 XXXX Ultra-Hide Latex Eggshell Interior Wall & Trim Enamel.
 - 2) Moore: Regal Premium Interior 100 Percent Acrylic Eggshell Finish W319.
 - 3) PPG: Speedhide Interior Eggshell Latex Enamel, Series 6-411.
 - 4) P & L: RedSeal Interior Eggshell Finish.
 - 5) S-W: ProMar 200 Eg-Shel, B20W2200 Series.
 - 6) CP: Fres~Coat 100% Acrylic Egg-Shell 531XX.
3. Semigloss, Epoxy Enamel Finish: Two finish coats over a primer with a total dry film thickness not less than 3.0 mils, excluding primer coat.
- a. Primer: Latex-based, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.
- 1) GP: Lifemaster No VOC Interior Primer 9116-1200.

- 2) Moore: Fresh Start All-Purpose 100 percent Acrylic Primer 023.
 - 3) PPG: Speedhide Quick-Drying Interior Latex Sealer, Series 6-2.
 - 4) P & L PRO-HIDE® Gold Interior Low Odor Latex Primer
 - 5) S-W: ProMar 200 Interior Latex Primer, B28W2600.
 - 6) CP: ENVIROTECH Zero VOC Interior Primer #64600.
- b. First and Second Coats: Interior, semigloss, epoxy enamel.
- 1) GP: 4426 XXXX Tru-Glaze-WB Waterborne Epoxy Semi-Gloss Coating.
 - 2) Moore: Super Spec Interior Latex Acrylic Epoxy Coating 256.
 - 3) PPG: Pitt-Glaze WB Water Borne Acrylic Epoxy 16-551/16-598 Series.
 - 4) P & L No known product meeting VOC 150 gm/l or less.
 - 5) S-W: Pro Industrial Hi-Bild WB Catalyzed Epoxy.
 - 6) CP: Tuf-On Waterborne Epoxy Gloss Enamel #15XX.

B. Ferrous Metal: Provide the following finish systems over ferrous metal:

1. Semigloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater and a primer.

- a. Primer: Quick-drying, rust-inhibitive, acrylic-metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

- 1) GP: Devflex 4020PF Direct to Metal Primer & Flat Finish.
- 2) Moore: P04 Super Spec HP Acrylic Metal Primer.
- 3) PPG: 90-712 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
- 4) P & L Universal Acrylic HP Primer.
- 5) S-W: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
- 6) CP: Everlife Alkyd Red Oxide Metal Primer 22150.

- b. Undercoat: Alkyd, interior enamel undercoat or semigloss, acrylic-latex, interior enamel, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

- 1) GP: 1416 XXXX Ultra-Hide Latex Semi-Gloss Interior Wall & Trim Enamel.
- 2) Moore: Super Spec 100 % Acrylic Semi-Gloss Enamel 281.
- 3) PPG: 9-500 Series Pure Performance Semi-Gloss Latex.
- 4) P & L RedSeal Interior Latex Semi-Gloss Enamel.
- 5) S-W: Pro Industrial Semi-Gloss, B66-650 Series.
- 6) CP: Fres~Coat 100% Acrylic Semi-Gloss 563XX.

- c. Finish Coat: Semigloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

- 1) GP: 1416 XXXX Ultra-Hide Latex Semi-Gloss Interior Wall & Trim Enamel.
- 2) Moore: Super Spec 100 % Acrylic Semi-Gloss Enamel 281.
- 3) PPG: 9-500 Series Pure Performance Semi-Gloss Latex.
- 4) P & L RedSeal Interior Latex Semi-Gloss Enamel.
- 5) S-W: Pro Industrial Semi-Gloss, B66-650 Series.
- 6) CP: Fres~Coat 100% Acrylic Semi-Gloss 563XX.

- C. Zinc-Coated Metal: Provide the following finish systems over zinc-coated metal:

- 1. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

- a. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

- 1) GP: 4020PF Direct to Metal Primer & Flat Finish.
- 2) Moore: P04 Super Spec HP Acrylic Metal Primer.
- 3) PPG: Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel, Series 90-709/712.
- 3) P & L Universal Acrylic HP Primer.
- 4) S-W: Pro Industrial Pro-Cryl Universal Primer, B66-310 Series.
- 5) CP: Rust Stop Metal Primer/Finish DTM 1061.

- b. Undercoat: Acrylic, interior enamel undercoat or semigloss, interior, acrylic-enamel finish coat, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils.

- 1) GP: 1416 XXXX Ultra-Hide Latex Semi-Gloss Interior Wall & Trim Enamel.
- 2) Moore: Super Spec 100 % Acrylic Semi-Gloss Enamel 281.
- 3) PPG: Speedhide InteriorEnamel Wall & Trim Semi-Gloss Acrylic Latex Series 6-500.
- 4) P & L RedSeal Interior Latex Semi-Gloss Enamel.
- 5) S-W: Pro Industrial Semi-Gloss, B66-650 Series.
- 6) CP: Fres~Coat 100% Acrylic Semi-Gloss 563XX.

- c. Finish Coat: Odorless, semigloss, acrylic, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.4 mils.

- 1) GP: 1416 XXXX Ultra-Hide Latex Semi-Gloss Interior Wall & Trim Enamel.
- 2) Moore: Super Spec 100 % Acrylic Semi-Gloss Enamel 281.
- 3) PPG: Speedhide InteriorEnamel Wall & Trim Semi-Gloss Acrylic Latex Series 6-500.

- 4) P & L RedSeal Interior Latex Semi-Gloss Enamel.
- 5) S-W: Pro Industrial Semi-Gloss, B66-650 Series.
- 6) CP: Fres~Coat 100% Acrylic Semi-Gloss 563XX.

D. Exposed Steel Structure and Steel Roof Deck: Provide the following finish over exposed steel structure, steel roof deck and applied fireproofing:

- 1. Eggshell, Latex-Enamel Dry Fog Finish: 2 finish coats over a primer.
 - a. Primer: Spot prime as required.
 - b. Finish Coats: Odorless, eggshell, latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.0 mils.
 - 1) GP: Spraymaster Pro, Uni-Grip-WB Aquacrylic Dryfall Flat Primer & Finish 1280-1200.
 - 2) Moore: Coronado SUPER KOTE 5000 Latex Dry Fall Flat 110 line.
 - 3) PPG: Speedhide Interior Super Tech Acrylic Dry-Fog Flat Latex, Series 6-725.
 - 4) P & L: Enducryl Latex Dry Falls, Series Z5900.
 - 5) S-W: Waterborne Acrylic Dry Fall, B42W2.
 - 6) CP: Latex Dry Fall 37X.

END OF SECTION 099100

SECTION 099300STAINING AND TRANSPARENT FINISHINGPART 1 - GENERAL1.1 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 application of wood stains and transparent finishes.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. 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.
- C. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- D. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- E. 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. Samples for Verification: For each type of finish system and in each color and gloss of finish required.
 - 1. Submit Samples on representative samples of actual wood substrates, 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.
- C. Product List: Cross-reference to finish 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. Stains and Transparent Finishes: 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 finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.
 - 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 stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

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 finishes only when temperature of surfaces to be finished and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply finishes 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 finishes in snow, rain, fog, or mist.

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. Benjamin Moore & Co.
 - 2. Coronado Paint; Benjamin Moore Company.
 - 3. Dulux (formerly ICI Paints); a brand of AkzoNobel.
 - 4. Dunn-Edwards Corporation.

5. Glidden Professional.
6. PPG Architectural Finishes, Inc.
7. Pratt & Lambert.
8. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.
9. Sherwin-Williams Company (The).
10. Zinsser; Rust-Oleum Corporation.

- B. Products: Subject to compliance with requirements, provide one of the products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- 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 manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Clear Wood Finishes, Varnishes: 350 g/L.
 2. Clear Wood Finishes, Lacquers: 550 g/L.
 3. Shellacs, Clear: 730 g/L.
 4. Stains: 250 g/L.
- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Stain Colors:
1. **ST-1:** Custom stain to match **PL-9**.
 2. **ST-2:** Custom stain to match **PL-7**.
 3. **ST-3:** Custom stain to match **PL-8**.
 4. **ST-4:** Custom stain to match **PL-6**.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Materials: Owner reserves the right to invoke the following procedure:
1. Owner will engage the services of a qualified testing agency to sample wood finishing materials. Contractor will be notified in advance and may be present when samples are taken. If 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 wood finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces before refinishing with complying materials if the two finishes are incompatible or produce results that, in the opinion of the Architect, are aesthetically unacceptable.

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 Interior Wood Substrates: 13 percent, when measured with an electronic moisture meter.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with finish application only after unsatisfactory conditions have been corrected.
 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
- D. Interior Wood Substrates:
 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
 3. Sand surfaces exposed to view and dust off.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dry.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
 1. Use applicators and techniques suited for finish and substrate indicated.
 2. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 3. Do not apply finishes over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from finish application. Correct damage 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 finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Architectural woodwork and wood board paneling.
 1. Moisture-Cured Clear Polyurethane over Stain System **MPI INT 6.1R**:
 - a. Stain Coat: Stain, semitransparent, for interior wood, **MPI #90**.
 - b. First Intermediate Coat: Water-based varnish matching topcoat.
 - c. Second Intermediate Coat: Water-based varnish matching topcoat.
 - d. Topcoat: Varnish, water based, clear, satin (MPI Gloss Level 4), **MPI #128**.

END OF SECTION 099300

SECTION 102113.16

PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Plastic-laminate-clad toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Requirements:
 - 1. Section 061053 "Miscellaneous Rough Carpentry" for blocking.
 - 2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Sustainable Design Submittals:
 - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
 - 2. Product Data: For adhesives, indicating that product contains no urea formaldehyde.
 - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Product Data: For composite wood products, indicating that product contains no urea formaldehyde.
 - 5. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
- C. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show locations of floor drains.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on 6-inch-152-mm- square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.

- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Door Hinges: Five hinge(s) with associated fasteners.
 - 2. Latch and Keeper: Five latch(es) and keeper(s) with associated fasteners.
 - 3. Door Bumper: Five door bumper(s) with associated fasteners.
 - 4. Door Pull: Five door pull(s) with associated fasteners.
 - 5. Fasteners: Twenty fasteners of each size and type.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 25 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in 2010 ADA Standards for Accessible Design and ICC A117.1 for toilet compartments designated as accessible.

2.2 PLASTIC-LAMINATE-CLAD TOILET COMPARTMENTS (TA-25, TA-26)

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Plastic Laminate Moisture Guard; ASI Global Partitions**, or comparable product by one of the following:
 - 1. Accurate Partitions Corporation.
 - 2. All American Metal Corp.
 - 3. American Sanitary Partition Corporation.
 - 4. Ampco, Inc.
 - 5. Bradley Corporation; Mills Partitions.
 - 6. Decolam.
 - 7. Flush Metal Partition Corp.
 - 8. General Partitions Mfg. Corp.

9. Knickerbocker Partition Corporation.
 10. Marlite.
 11. Metpar Corp.
 12. Scranton Products.
 13. Tex-Lam Manufacturing, Inc.
 14. Weis-Robart Partitions, Inc.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screen Style: Floor anchored.
- D. Door, Panel, and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores; with laminate applied to edges before faces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.
1. Core Material: Particleboard.
 2. Doors and Panels: Finished to not less than 1 inch (25 mm) thick.
 3. Pilasters: Provide construction to comply with the following:
 - a. Finished to not less than 1 inch (25 mm) thick and with internal, nominal 0.120-inch-(3.04-mm-) thick, steel-sheet reinforcement.
- E. Pilaster Shoes: Formed from stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.
- F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe matching that on the pilaster.
- G. Brackets (Fittings):
1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.
- H. Plastic-Laminate Finish: One color and pattern in each room.
1. Color and Pattern:
 - a. **TA-25:** As selected by Architect.
 - b. **TA-26:** As selected by Architect.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door.
 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.

6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

- A. Particleboard: ANSI A208.1, Grade M-2.
 1. Particleboard shall be made without urea formaldehyde.
- B. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
- E. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. 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.
- C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes at posts to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 1. Confirm location and adequacy of blocking and supports required for installation.

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

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.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

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 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.16

SECTION 102113TOILET COMPARTMENTSPART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section Includes:
 - 1. Phenolic-core toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections include the following:
 - 1. Division 06 Section "Miscellaneous Carpentry" for wood blocking.
 - 2. Division 10 "Toilet, Bath and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories.

1.3 SUBMITTALS:

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
 - 2. Show locations of reinforcements for compartment-mounted grab bars.
- C. Samples for Initial Selection: For each type of unit indicated.
- D. Samples for Verification: Of each type of color and finish required for units, prepared on 6-inch-square Samples of same thickness and material indicated for Work.

1.4 QUALITY ASSURANCE:

- A. Comply with requirements in CID-A-A-60003, "Partitions, Toilets, Complete."

1.5 PROJECT CONDITIONS:

- A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating toilet compartments without field measurements. Coordinate wall, floor, ceilings, and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 75 or less.
 - 2. Smoke-Developed Index: 450 or less.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 PHENOLIC-CORE UNITS:

- A. Basis-of-Design Product [**TP-1**]: Subject to compliance with requirements, provide “**Solid Phenolic Toilet Enclosures; General Partitions Mfg. Corp.**, or approved equivalent of one of the following:
 - 1. Global Partitions.
 - 2. Metpar Corp,
 - 3. Accurate Partitions Corp.
- B. Door, Panel and Pilaster Construction: Solid phenolic-core panel material with plastic laminate facing on both sides fused to substrate during panel manufacture, and with eased and polished edges. Provide minimum 3/4-inch- thick doors and pilasters and minimum 1/2-inch- thick panels.
 - 1. Core Color: Black.
 - 2. Facing Sheet Finish:
 - a. As indicated by laminate manufacturer's designations.

| FINISH | MANUFACTURER | STYLE/PATTERN | COLOR |
|--------|--------------|---------------|-------------------------|
| PL-1 | Pionite | | Leather L-Finish- Black |
| PL-2 | Pionite | | AG021 Suede- Sable |

- C. Heavy-duty “Bank Vault” hinge shall have gravity-acting cams, fabricated from 12 gauge, 304 stainless steel. Hinges are through-bolted onto doors and pilasters using stainless steel tamper resistant through bolts. Hinges are easily adjusted at the job site to a full close or partially open position, as required.
- D. Urinal-Screen Style: Wall hung, flat panel.
 - 1. Continuous heavy duty stainless steel wall brackets are pre-drilled. Wall brackets are mounted with stainless steel, vandal-resistant screws.

- E. Pilaster Shoes and Sleeves (Caps): Stainless steel, ASTM A 666, Type 302 or 304, not less than 0.0312 inch specified thickness and 3 inches high, finished to match hardware.
- F. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.

2.3 ACCESSORIES:

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - 1. Material: Stainless steel.
 - 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees.
 - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Fabricate from 12 gauge 304 stainless steel.
 - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Fabricate from 304 stainless steel.
 - a. Provide coat hook without bumper on Handicap stalls only.
 - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors. Fabricate from 304 stainless steel.
 - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Fabricate from 304 stainless steel.
 - a. Provide one (1) additional pull handle on the compartment side of the door, mounted 6-inches from the hinge edge and between 26 and 36-inches above the floor. Provide pull with a shape that is easily grasped with one hand and does not require tight, pinching or twisting of the wrist to operate.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

2.4 FABRICATION:

- A. 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. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with not less than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Wall-Hung Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb and to resist lateral impact.
- C. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

3.2 ADJUSTING:

- A. Hardware Adjustment: Adjust and lubricate hardware according to manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10155

SECTION 102213

WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section Includes:
 - 1. Standard-duty wire mesh partitions.

1.3 DEFINITIONS:

- A. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
- B. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

1.4 ACTION SUBMITTALS:

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate clearances required for operation of doors.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: 12-by-12-inch (300-by-300-mm) panel constructed of specified frame members and wire mesh. Show method of finishing members at intersections.
- E. Delegated-Design Submittal: For wire mesh partitions indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS:

- A. Qualification Data: For Installer.
- B. Welding certificates.

1.6 CLOSEOUT SUBMITTALS:

- A. Maintenance Data: For wire mesh partition hardware to include in maintenance manuals.

1.7 QUALITY ASSURANCE:

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.8 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped to provide protection during transit and Project-site storage. Use vented plastic.
- B. Inventory wire mesh partition door hardware on receipt, and provide secure lockup for wire mesh partition door hardware delivered to Project site.
 - 1. Tag each item or package separately with identification, and include basic installation instructions with each item or package.

1.9 FIELD CONDITIONS:

- A. Field Measurements: Verify actual dimensions of construction contiguous with wire mesh units by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Series **FordLogan Woven Wire Partitions as manufactured by SpaceGuard Products** or comparable product by one of the following:
 - 1. Acorn Wire & Iron Works, LLC.
 - 2. American Woven Wire Corporation.
 - 3. California Wire Products Corporation.
 - 4. Central Wire and Iron.
 - 5. Folding Guard Corporation.
 - 6. G-S Company (The).
 - 7. Indiana Wire Products, Inc.
 - 8. Jesco Industries, Inc.

9. Kenco Wire and Iron Products Inc.
10. King Wire Partitions, Inc.
11. Miller Wire Works, Inc.
12. Newark Wire Works Inc.
13. Standard Wire & Steel Works.
14. Wire Crafters, LLC..

2.2 PERFORMANCE REQUIREMENTS:

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design wire mesh units.
- B. Structural Performance: Wire mesh units shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 1. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m) at any location on a panel.
 2. Total load of 200 lbf (0.89 kN) applied uniformly over each panel.
 3. Concentrated load and total load need not be assumed to act concurrently.
- C. Seismic Performance: Wire mesh units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 1. Component Importance Factor: 1.5.

2.3 MATERIALS:

- A. Steel Wire: ASTM A 510 (ASTM A 510M).
- B. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
- C. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- D. Steel Tubing: ASTM A 500/A 500M, cold-formed structural-steel tubing or ASTM A 513, Type 5, mandrel-drawn mechanical tubing.
- E. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating designation.
- F. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.

- G. Post-Installed Anchors: Capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components are zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
- H. Power-Driven Fasteners: ICC-ES AC70.
- I. Seismic Bracing: Angles with legs not less than 1-1/4 inch (32 mm) wide, formed from 0.040-inch- (1.0-mm-) thick, metallic-coated steel sheet; with bolted connections and 1/4-inch- (6-mm-) diameter bolts.
- J. Shop Primers: Provide primers that comply with Section 099100 "Painting."
- K. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, complying with MPI#79.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- L. Zinc-Rich Primer: Compatible with topcoat, complying with SSPC-Paint 20 or SSPC-Paint 29.

2.4 STANDARD-DUTY WIRE MESH PARTITIONS:

- A. Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate-crimp steel wire woven into 1-1/2-inch (38-mm) diamond mesh.
- B. Vertical Panel Framing: 1-1/4-by-5/8-by-0.080-inch (32-by-16-by-2.0-mm) cold-rolled, C-shaped steel channels with holes for 1/4-inch- (6-mm-) diameter bolts not more than 12 inches (300 mm) o.c.
- C. Horizontal Panel Framing: 1-by-1/2-by-1/8-inch (25-by-13-by-3.2-mm) cold-rolled steel channels.
- D. Horizontal Panel Stiffeners: Two cold-rolled steel channels, 3/4 by 3/8 by 1/8 inch (19 by 9.5 by 3.2 mm), bolted or riveted toe to toe through mesh or one 1-by-1/2-by-1/8-inch (25-by-13-by-3.2-mm) cold-rolled steel channel with wire mesh woven through channel.
- E. Top Capping Bars: 2-1/4-by-1-inch (57-by-25-mm) cold-rolled steel channels.
- F. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3.2-mm) steel angles or square tubes with holes for 1/4-inch- (6-mm-) diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.

- G. Posts for Other-Than-90-Degree Corners: Steel pipe or tubing with holes for 1/4-inch- (6-mm-) diameter bolts aligning with bolt holes in vertical framing; with floor anchor clips.
 - 1. Partitions up to 12 Feet (3.7 m) High: 1-1/4-inch (32-mm) OD by 1/8 inch (3.2 mm).
- H. Adjustable Corner Posts: Two 1-1/4-by-5/8-by-0.080-inch (32-by-16-by-2.0-mm) cold-rolled, C-shaped steel channels connected by steel hinges at 36 inches (900 mm) o.c., with holes for 1/4-inch- (6-mm-) diameter bolts aligning with bolt holes in vertical framing.
- I. Line Posts: 3-inch-by-4.1-lb (76-mm-by-1.9-kg) or 3-1/2-by-1-1/4-by-0.127-inch (89-by-32-by-3.2-mm) steel channels; with 1/4-inch (6.4-mm) steel base plates.
- J. Three-Way Intersection Posts: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3.2-mm) steel tubes or channels, with holes for 1/4-inch- (6-mm-) diameter bolts aligned for bolting to adjacent panels.
- K. Floor Shoes: Metal, not less than 2 inches (50 mm) high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
- L. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3.2-mm) steel channels or 1-1/4-by-5/8-by-0.080-inch (32-by-16-by-2.0-mm) cold-rolled, C-shaped steel channels, banded with 1-1/4-by-1/8-inch (32-by-3.2-mm) flat steel bar cover plates on three sides, and with 1/8-inch- (3.2-mm-) thick angle strike bar and cover on strike jamb.
 - 1. Hinges: Full-surface type, 3-by-3-inch (76-by-76-mm) steel, three per door; bolted, riveted, or welded to door and jamb framing.
 - 2. Cylinder Lock: Mortise type with manufacturer's standard cylinder; operated by key outside and lever inside.
 - 3. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.
- M. Accessories:
 - 1. Sheet Metal Base: 0.060-inch- (1.5-mm-) thick steel sheet.
 - 2. Adjustable Filler Panels: 0.060-inch- (1.5-mm-) thick steel sheet, capable of filling openings from 2 to 12 inches (50 to 300 mm).
 - 3. Wall Clips: Manufacturer's standard, steel sheet; allowing up to 1 inch (25 mm) of adjustment.
- N. Finish: Powder-coated finish unless otherwise indicated.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.5 FABRICATION:

- A. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. Furnish bolts, hardware, and accessories required for complete installation with manufacturer's standard finishes.
 - 1. Fabricate wire mesh items to be readily disassembled.
 - 2. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint.

- B. Standard-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - 1. Mesh: Weld mesh to framing.
 - 2. Framing: Fabricate framing with mortise and tenon corner construction.
 - a. Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
 - b. Fabricate three-way intersections using manufacturer's standard connecting clips and fasteners.
 - c. Fabricate partition and door framing with slotted holes for connecting adjacent panels.
 - 3. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
 - 4. Doors: Align bottom of door with bottom of adjacent panels.
 - a. For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
 - 5. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.

- C. Wire Mesh Ceilings: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - 1. Mesh: Weld mesh to framing.
 - 2. Framing: Fabricate framing with welded corner construction.
 - a. Provide stiffeners as indicated or, if not indicated, as required by panel span and as recommended by wire mesh ceiling manufacturer. Weld stiffeners to framing.

2.6 STEEL AND IRON FINISHES:

- A. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on powder-coat finish, suitable for use indicated, with a minimum dry film thickness of 2 mils (0.05 mm).
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine floors for suitable conditions where wire mesh items will be installed.
- C. Examine walls to which wire mesh items will be attached for properly located blocking, grounds, and other solid backing for attachment of support fasteners.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 WIRE MESH PARTITIONS ERECTION:

- A. Anchor wire mesh partitions to floor with 3/8-inch- (9.5-mm-) diameter postinstalled expansion anchors at 12 inches (300 mm) o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
 - 1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- B. Anchor wire mesh partitions to floor with 3/8-inch- (9.5-mm-) diameter postinstalled expansion anchors at 12 inches (305 mm) o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
 - 1. Anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
- C. Anchor wire mesh partitions to walls at 12 inches (305 mm) o.c. through back corner panel framing and as follows:
 - 1. For concrete and solid masonry anchorage, use expansion anchors.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For wood stud partitions, use lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - 4. For steel-framed gypsum board assemblies, use lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - 5. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
- D. Secure top capping bars to top framing channels with 1/4-inch- (6-mm-) diameter "U" bolts spaced not more than 28 inches (700 mm) o.c.

- E. Provide line posts at locations indicated or, if not indicated, as follows:
 - 1. For partitions that are 7 to 9 feet (2.1 to 2.7 m) high, spaced at 15 to 20 feet (4.6 to 6.1 m) o.c.
- F. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.
- G. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
- H. Install doors complete with door hardware.
- I. Install service windows complete with window hardware.
- J. Bolt accessories to wire mesh partition framing.

3.3 ADJUSTING AND CLEANING:

- A. Adjust doors to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.
- B. Remove and replace defective work, including doors and framing that are warped, bowed, or otherwise unacceptable.
- C. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

END OF SECTION 102213

SECTION 102600WALL AND DOOR PROTECTIONPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Corner guards.
- 2. Wall guards.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
 - 2. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.

1.4 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
- B. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of impact-resistant wall protection unit indicated.
 - 1. Include similar Samples of accent strips and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Corner Guards: 12 inches (300 mm) long. Include examples of joinery, corners, and field splices.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Certificates: For each impact-resistant plastic material, from manufacturer.
- C. Material Test Reports: For each impact-resistant plastic material.
- D. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
 - 1. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.

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. Corner-Guard: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of units installed, but no fewer than two, 4-foot- (1.2-m-) long units.
- B. Include mounting and accessory components. Replacement materials shall be from same production run as installed units.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated. Refer to Section 014000 "Quality Requirements."
- D. Revise subparagraph below to suit Project.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
- F. Preinstallation Conference: Conduct conference at Project site.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - 1. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
 - 2. Keep plastic sheet material out of direct sunlight.

3. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).
 - a. Store corner-guard covers in a vertical position.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Deterioration of plastic and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M.
- B. Fasteners: Nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- C. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

2.2 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards (**CG-#**), Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Stainless Steel Corner Guard, Surface Mount, GS35; Korogard Wall Protection Systems; a division of RJF International Corporation**, or comparable product by one of the following:
 - a. American Floor Products Co., Inc.
 - b. Arden Architectural Specialties, Inc.
 - c. Balco, Inc.
 - d. Boston Retail Products.
 - e. Construction Specialties, Inc.
 - f. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 - g. Pawling Corporation.
 - h. Tepromark International, Inc.
 - i. WallGuard.com.

2. Material: Stainless steel, Type 430.
 - a. Thickness: Minimum 0.0598 inch (16 Ga.).
 - b. Finish: Directional satin, No. 4.
3. Wing Size: Nominal 3-1/2 by 3-1/2 inches (88.9 by 88.9 mm).
4. Corner Radius: 1/8 inch (3 mm).
5. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.3 WALL GUARDS

- A. Bumper Rail: Standard-duty assembly consisting of continuous snap-on plastic cover installed over concealed retainer; designed to withstand impacts.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Series EcoFlex 3300; Boston Retail Products.** or comparable product by one of the following:
 - a. Korogard Wall Protection Systems; a division of RJF International Corporation.
 - b. Nystrom, Inc.
 - c. Pawling Corporation.
 2. Cover: Extruded rigid plastic, 80percent recycled material; as follows:
 - a. Profile: Flat profile, nominal, 0.086-inch (21.84-mm) x 2.89-inch (73.4-mm)
 - b. Color and Texture: As selected by Architect from manufacturer's full range.
 3. Continuous Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
 4. Retainer Clips: Manufacturer's standard impact-absorbing clips.
 5. Bumper: Continuous, resilient bumper cushion(s).
 6. End Caps and Corners: Prefabricated, injection-molded plastic; matching color cover; field adjustable for close alignment with snap-on cover.
 7. Accessories: Round vinyl end caps, concealed splices and mounting hardware.
 8. Mounting: Surface mounted directly to wall.

2.4 FABRICATION

- A. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
- B. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.
- D. Miter corners and ends of wood handrails for returns.

2.5 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 1. Remove tool and die marks and stretch lines, or blend into finish.

2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 3. Run grain of directional finishes with long dimension of each piece.
 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
1. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
 - a. Provide anchoring devices to withstand imposed loads.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 102600

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
 - 1. Toilet and bath accessories.
- B. Related Sections include the following:
 - 1. Section 102113 "Toilet Compartments" for compartments and screens.

1.3 SUBMITTALS:

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 01. Provide lists of replacement parts and service recommendations.

1.4 QUALITY ASSURANCE:

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
 - 1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.

2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

1.5 COORDINATION:

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY:

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
 1. Minimum Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers: Subject to compliance with requirements, provide toilet accessories by one of the following:
 1. American Specialties, Inc.
 2. Bobrick Washroom Equipment, Inc.
 3. Bradley Corporation.
 4. Georgia-Pacific.
- B. Products manufactured by Bobrick Washroom Equipment, Inc., and Georgia-Pacific are specified. Items designated establish minimum requirements for design and performance of equipment required by this Section.

2.2 MATERIALS:

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Galvanized Steel Sheet: ASTM A 653/A 653M, G60.

- C. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
- D. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

2.3 FABRICATION:

- A. General: One, maximum 1-1/2-inch-diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- C. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
 - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- D. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
 - 1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING:

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE:

- A. Grab Bars - Stainless Steel Type [TA-1#]: Provide grab bars with wall thickness not less than 0.05 inch (18 gage) and as follows:
 - 1. Mounting: Concealed, manufacturer's standard flanges and anchorage with four set-screws.
 - 2. Clearance: 1-1/2-inch clearance between wall surface and inside face of bar.
 - 3. Gripping Surfaces: Manufacturer's standard nonslip texture.
 - 4. Heavy-Duty Size: Outside diameter of 1-1/2 inches.
 - 5. [TA-1A] Product: Bradley Corp. Model **812 x 18"**.
 - 6. [TA-1D] Product: Bradley Corp. Model **812 x 42"**.
- B. Toilet Tissue Dispenser "TA-2D": Where this designation is indicated, provide toilet tissue dispenser complying with the following:
 - 1. Jumbo-roll toilet tissue dispenser door and cabinet shall be type-304 stainless steel with satin-finish: door shall be 18 gauge (1.2mm); cabinet shall be 20 gauge (1.0mm). Cabinet shall be equipped with a tumbler lock keyed like other Bobrick washroom accessories. Door shall have a wide viewing slot to reveal toilet tissue supply inside cabinet. Dispensing mechanism shall be constructed of high-impact ABS shall accommodate two toilet tissue rolls up to 10" (255mm) diameter with 3" (75mm) diameter core; and be equipped with a sliding access panel that exposes one roll at a time. Spindles shall be convertible in the field to dispense 2-1/4" (55mm) diameter core rolls by removing outer spindles furnished in-place.
 - 2. Product: Model No. **B-2892**, surface mounted.

- C. Recessed Sanitary Napkin/Tampon Vendor Unit [**TA-5B**]: Where this designation is indicated, provide stainless-steel sanitary napkin vendor complying with the following:
1. General: Fabricate cabinet of all-welded construction. Provide seamless door with returned edges and secured by tumbler lockset. Provide identification reading "Napkins" and "Tampons"; brand-name advertising is not allowed. Capacity not less than 31 napkins and 22 tampons.
 2. Operation: Coordinate price with Owner.
 3. Product: Bobrick Model **B-37063C Trimline Series**.
- D. Semi-Recessed Waste Receptacle [**TA-6B**]: Where this designation is indicated, provide semi-recessed paper towel dispenser complying with the following:
1. Recessed waste receptacle shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Flange shall be drawn and beveled, one-piece, seamless construction. Removable waste receptacle shall be secured to cabinet with a tumbler lock keyed like other Bobrick washroom accessories, have front and side edges of bottom and all top edges hemmed for safe handling, and shall have a minimum capacity of 12-gal. (45.4-L).
 2. Product: Bobrick Model **B-3644**.
- E. [**TA-7A**] Surface Mounted Paper Towel Dispenser: Where this designation is indicated, provide stainless-steel paper towel dispenser unit complying with the following:
1. Surface Mounted Automated Towel Dispenser, hands-free, electronic towel dispenser, engineered to be surface mounted to the wall.
 2. Battery operated.
 3. Product: Wausau Paper Wall Mount Automated Touchless Towel Dispenser, Model **Wave'n Dry**.
- F. Surface Mounted Sanitary Napkin Disposal [**TA-8A**]: Where this designation is indicated, provide stainless-steel combination unit complying with the following:
1. Surface-mounted sanitary napkin disposal shall be type-304 stainless steel with all-welded construction; exposed surfaces shall have satin finish. Door shall be secured to cabinet with a full-length stainless steel piano-hinge and equipped with a tumbler lock keyed like other washroom accessories. Unit shall have a self-closing panel covering disposal opening. Panel shall have bottom edge hemmed for safety, be secured to door with a spring-loaded, full-length stainless steel piano-hinge, and equipped with an international graphic symbol identifying sanitary napkin disposal. Unit shall be furnished with a removable, leak-proof, rigid molded polyethylene receptacle. Receptacle shall have a capacity of 1.5-gal. (6.6-L).
 - a. Bradley Model No. **4722-15**

- G. Soap Dispenser [TA-10]: Where this designation is indicated, provide soap dispenser complying with the following:
1. Surface-mounted foam soap dispenser, battery operated.
 - a. Dimensions: 10" Height x 6" Width x 4" Depth.
 2. Product: GOJO USA Model No. **H-1585 Touch Free Dispenser - Dove Gray**.
- H. Surface Mounted Electric Backlit Mirror [TA-11G]: Where this designation is indicated, provide surface mounted electric backlit mirror complying with the following:
1. The Fusion™ Lighted Mirror by Electric Mirror has two bands of vertical frosted light on the left and right sides of the backlit mirror and comes in six standard sizes. Fusion features long lasting lamps, natural light temperature, anti-corrosion mirror treatment, energy efficiency, and is proudly designed and manufactured in the USA.
 2. Size: Custom size, 18"W x 36" H.
 3. Product: Electric Mirror, LLC, Model **Fusion Lighted Mirror**.
- I. Clothes Hook [TA-13]: Where this designation is indicated, provide clothes hook complying with the following:
1. Clothes Hook: Clothes hook shall be type-304, 11-gauge stainless steel with satin finish and all-welded construction. Surface mounted with stainless steel fasteners.
 2. Product: Bobrick Model No. **B-233**.
- J. Mop and Broom Holder [TA-14]: Where this designation is indicated, provide mop and broom holder with rag hooks complying with the following:
1. Mop and Broom Holder/Utility Shelf: Combination unit with 0.05-inch (18-gage), Type 304, stainless steel shelf with 1/2-inch returns, 0.062-inch (16-gage) support brackets for wall mounting. Provide 0.062-inch (16-gage) stainless steel hooks for wiping rags on front of shelf, together with spring-loaded, rubber hat, cam-type mop/broom holders; 1/4-inch-diameter stainless steel drying rod suspended beneath shelf. Provide unit 36 inches long and complete with four mop/broom holders and rag rod.
 2. Product: Bradley Corp., **9954-36**.
- K. Pipe Insulation [TA-23]: Provide pipe insulation and fittings on hot and cold supplies and P-trap and waste below sinks on ADA accessible units utilizing one of the following:
- a. Lav Guard 2 EZ; TRUEBRO, IPS Corporation.
 - b. Pro Wrap; McGuire Manufacturing Co., Inc.
- L. Toilet Accessory [TA-25]: Toilet partitions. Refer to Specification Section 102113 - Toilet Compartments.
- M. Toilet Accessory [TA-26]: Urinal Screens. Refer to Specification Section 102113 - Toilet Compartments.

- N. Surface Mounted Toilet Seat Cover Dispenser [**TA-35**]: Where this designation is indicated, provide surface mounted toilet seat cover dispenser complying with the following:
1. Surface-mounted seat cover dispenser, with face formed with contemporary contours, radii, and finish matching related accessories in manufacturer's designer series. Capacity 250 standard single-fold or half-fold toilet seat covers. Equipped with spring clip dispensing mechanism and bottom-hinged service door with keyed tumbler lock. Universal keying. Formed from stainless steel sheet with satin finish on exposed surfaces, fully welded, with seamless corners and burrfree edges: cabinet and door 0.036- inch / 20-ga. thick.
 2. Product: Bradley Model **5A40**.
- O. Sharps Receptacle and Mail System [**TA-37**]: One Quart Disposal by Mail System. Approximately 50-70 lcc syringe capacity. Sharps Container Cabinet, lockable metal container.
1. Sharps Item: **#10101-012**.
 2. Sharps Item: **#50020-004**.
 3. Provide one cabinet and container in each toilet room.
 4. http://www.allsafetyproducts.com/documents/catalogs/Catalog_Page_285.pdf or as approved by the Architect.

END OF SECTION 102800

SECTION 104413

FIRE PROTECTION 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 Requirements:
 - 1. Section 104416 "Fire Extinguishers."

1.3 PREINSTALLATION CONFERENCE

- A. 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
- B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches (150 by 150 mm) square.
- D. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.7 SEQUENCING

- A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET (FEC-1)

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Model Alpine; Nystrom, Inc., or comparable product by one of the following:
 - a. Fire-End & Croker Corporation.
 - b. GMR International Equipment Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Larsens Manufacturing Company
 - g. Potter Roemer LLC.
 - h. Strike First Corporation of America.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **#FC-7057; Nystrom; Alpine™ Fire Extinguisher Cabinet.**
 - 1. Description: Steel unit construction, continuous piano hinge with 180 degree opening. Weld joints and grind smooth.
 - 2. Cabinet Mounting: ecessed, 1/2 inch (12.7 mm)
 - 3. Components:
 - a. Door and Frame:
 - 1) 0.0652 inch (1.66mm) stainless steel.
 - 2) Color and Finish: Type 304 Stainless Steel with #4 finish.
 - b. Tub: 0.036 inch (0.9mm) cold rolled steel
 - 1) Color Finish: White factory applied powder coat paint finish.
 - c. Door Type: Full glass with tempered safety glass.
 - 4. Options:
 - a. Lettering: Vertical decal, red, 2-inch high lettering.
 - b. Latching: Pull handle roller catch.

5. Cabinet Dimensions: Size to match extinguisher type.
6. Fire Rating: Non-fire rated.

2.3 FIRE-PROTECTION CABINET (FEC-2)

- A. Cabinet Type: Suitable for fire extinguisher.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Model Alpine; Nystrom, Inc., or comparable product by one of the following:
 - a. Fire-End & Croker Corporation.
 - b. GMR International Equipment Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Larsens Manufacturing Company
 - g. Potter Roemer LLC.
 - h. Strike First Corporation of America.

- B. Basis-of-Design Product: Subject to compliance with requirements, provide **#FRC-7057; Nystrom; Alpine™ Fire Extinguisher Cabinet.**
 1. Description: Steel unit construction, continuous piano hinge with 180 degree opening. Weld joints and grind smooth.
 2. Cabinet Mounting: ecessed, 1/2 inch (12.7 mm)
 3. Components:
 - a. Door and Frame:
 - 1) 0.0652 inch (1.66mm) stainless steel.
 - 2) Color and Finish: Type 304 Stainless Steel with #4 finish.
 - b. Tub: 0.036 inch (0.9mm) cold rolled steel
 - 1) Color Finish: White factory applied powder coat paint finish.
 - c. Door Type: Full glass with tempered safety glass.
 4. Options:
 - a. Lettering: Vertical decal, red, 2-inch high lettering
 - b. Latching: Pull handle roller catch.
 5. Cabinet Dimensions: Size to match extinguisher type.
 6. Fire Rating: Fire rated for 1 hour or 2 hour combustibile and non-combustibile wall systems.

2.4 FIRE-PROTECTION CABINET (FEC-3)

- A. Cabinet Type: Suitable for fire extinguisher.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide Model Ridge; Nystrom, Inc., or comparable product by one of the following:
 - a. Fire-End & Croker Corporation.
 - b. GMR International Equipment Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. JL Industries, Inc.; a division of the Activar Construction Products Group.

- e. Modern Metal Products, Division of Technico Inc.
- f. Larsens Manufacturing Company
- g. Potter Roemer LLC.
- h. Strike First Corporation of America.

B. Basis-of-Design Product: Subject to compliance with requirements, provide **#FC-7337; Nystrom; Ridge™ Fire Extinguisher Cabinet.**

1. Description: Steel unit construction, continuous piano hinge with 180 degree opening, architectural convex, clear “bubble” window.
2. Cabinet Mounting: Recessed, 1/2 inch (12.7 mm)
3. Components:
 - a. Door and Frame:
 - 1) 6063-T5 anodized aluminum.
 - 2) Color and Finish: Satin finish, clear polyester coating.
 - b. Tub: 0.036 inch (0.9mm) cold rolled steel
 - 1) Color Finish: White factory applied powder coat paint finish.
 - c. Door Type: Convex Clear Full Bubble.
4. Options:
 - a. Lettering: Vertical decal, red, 2-inch high lettering.
 - b. Latching: Pull handle roller catch.
5. Cabinet Dimensions: Size to match extinguisher type.
6. Fire Rating: [Non-fire rated][Fire rated for 1 hour or 2 hour combustible and non-combustible wall systems]

2.5 FIRE-PROTECTION CABINET (FEC-4)

A. Cabinet Type: Suitable for fire extinguisher.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Model Ridge; Nystrom, Inc., or comparable product by one of the following:
 - a. Fire-End & Croker Corporation.
 - b. GMR International Equipment Corporation.
 - c. Guardian Fire Equipment, Inc.
 - d. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Larsens Manufacturing Company
 - g. Potter Roemer LLC.
 - h. Strike First Corporation of America.

B. Basis-of-Design Product: Subject to compliance with requirements, provide **#FC-FRC-7338; Nystrom; Ridge™ Fire Extinguisher Cabinet.**

1. Description: Steel unit construction, continuous piano hinge with 180 degree opening, architectural convex, clear “bubble” window.
2. Cabinet Mounting: Semi-Recessed-2inch (50.8 mm)
3. Components:
 - a. Door and Frame:
 - 1) 6063-T5 anodized aluminum.

- 2) Color and Finish: Satin finish, clear polyester coating.
- b. Tub: 0.036 inch (0.9mm) cold rolled steel
 - 1) Color Finish: White factory applied powder coat paint finish.
- c. Door Type: Convex Clear Full Bubble.
- 4. Options:
 - a. Lettering: Vertical decal, red, 2-inch high lettering.
 - b. Latching: Pull handle roller catch.
- 5. Cabinet Dimensions: Size to match extinguisher type.
- 6. Fire Rating: Fire rated for 1 hour or 2 hour combustible and non-combustible wall systems.

2.6 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.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 - 2. Fabricate door frames of one-piece construction with edges flanged.
 - 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed 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:
 - 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. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

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 - GENERAL1.1 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 and mounting brackets for fire extinguishers.
- B. Related Sections include the following:
 - 1. Division 10 Section "Fire Protection 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 and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
- D. 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.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
 - a. Schedules and coordination requirements.

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 and mounting bracket indicated.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide products manufactured by **Nystrom**, or comparable product by one of the following:
 - a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - b. Larsens Manufacturing Company
 - c. Potter Roemer LLC.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type [**FE-1**]: UL-rated 2-A:10:B:C, 5-lb nominal capacity, in enameled-steel container.
 - 1. Model: **EX-3005**, or equal.
- C. Wet Chemical Type [**FE-2**]: UL-rated 2-A:1:B:C:K, 6-liter capacity, in enameled steel container.
 - 1. Model No. **EX-3260**, or equal.
 - 2. Potassium acetate based, low PH agent which leaves no chemical residue to clean up.
 - 3. Locations: Kitchen and food preparation areas.

2.2 MOUNTING BRACKETS:

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - 1. Standard: Model #EX-3902; Nystrom, or equal.
 - 2. Kitchen: Model #EX-3904; Nystrom, or equal.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.
 - b. Letter Height: 2-inches.

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 extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes the following:
1. Knocked-down corridor lockers, including the following:
 - a. Double tier.
 - b. Locker benches.
- B. Related Sections include the following:
1. Division 03 Section "Cast-In-Place Concrete" for concrete bases.
 2. Division 04 Section "Unit Masonry" for concrete masonry bases.
 3. Division 06 Section "Miscellaneous Rough Carpentry" for wood furring and grounds.

1.3 SUBMITTALS:

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of locker and bench.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
1. Show locker fillers, trim, base, sloping tops, and accessories. Include locker-numbering sequence.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for units with factory-applied color finishes.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes, showing the full range of color, texture, and pattern variations expected. Prepare Samples from the same material to be used for the Work.
1. Lockers.
- E. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals specified in Division 01.

1.4 QUALITY ASSURANCE:

- A. Source Limitations: Obtain locker units and accessories through one source from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Do not deliver lockers until spaces to receive them are clean, dry, and ready for locker installation.
- B. Protect lockers from damage during delivery, handling, storage, and installation.

1.6 COORDINATION:

- A. Coordinate size and location of concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 3 Section "Cast-in-Place Concrete."

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Republic Storage Systems, LLC; Heavy Duty Corridor Locker or equal products by one of the following:
 - 1. ASI Storage Solutions, Inc..
 - 2. Art Metal Products.
 - 3. DeBourgh Mfg. Co.
 - 4. List Industries Inc.
 - 5. Lyon Workspace Products.
 - 6. Penco Products, Inc.

2.2 MATERIALS:

- A. Cold-Rolled Steel Sheet: ASTM A 366/A 366M, matte finish, suitable for exposed applications, and stretcher leveled or roller leveled to stretcher-leveled flatness.
- B. Galvanized Steel Sheet: ASTM A 653/A 653M, commercial quality, G60 coating designation; mill phosphatized; suitable for exposed applications, and stretcher leveled or roller leveled to stretcher-leveled flatness.
- C. Extruded Aluminum: ASTM B 221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
- D. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

2.3 WARDROBE LOCKERS:

- A. Body: Form backs, tops, bottoms, sides, and intermediate partitions from steel sheet; flanged for double thickness at back vertical corners. Comply with the following:
 - 1. Body: Form backs, tops, bottoms, and sides, from 0.0239-inch thick sheet steel.
 - 2. Exposed Ends: Form exposed ends of nonrecessed lockers from minimum 0.0239-inch-thick steel sheet.

- B. Frames: Form channel frames from minimum 0.0598-inch-thick steel sheet; lapped and welded at corners. Form continuous integral door strike on vertical frame members. Provide resilient bumpers to cushion door closing.
 - 1. Latch Hooks: Form from minimum 0.1046-inch-thick steel; welded or riveted to door frames.

- C. Doors: One-piece steel sheet, formed into channel shape at vertical edges and flanged at right angles at top and bottom edges. Fabricate to prevent springing when opening or closing, and to swing 180 degrees. Comply with the following:
 - 1. Sheet Thickness: 0.0747 inch minimum.
 - 2. Reinforcing and Sound-Dampening Panels: Brace or reinforce inner face of doors with manufacturer's standard reinforcing angles, channels, or stiffener panels.
 - 3. Ventilation: Perimeter of door. Louvers in door not allowed.

- D. Shelves: Provide hat shelf in single-tier units; fabricated from minimum 0.0239-inch-thick, formed steel sheet; flanged on all edges.

- E. Hinges: Steel, full loop, five or seven knuckle; tight pin; minimum 2 inches high. Weld to inside of door frame and attach to door with at least two factory-installed fasteners that are completely concealed and tamper resistant when door is closed.
 - 1. Provide at least three hinges for each door more than 42 inches high and at least two hinges for each door 42 inches high or less.

- F. Recessed Handle and Latch: Manufacturer's standard housing, formed from 0.0359-inch-thick nickel-plated steel or stainless steel, with integral door pull, recessed for latch lifter and locking devices; nonprotruding latch lifter; and automatic, prelocking, pry-resistant latch, as follows:
 - 1. Provide minimum three-point latching for each door more than 42 inches high; minimum two-point latching for each door 42 inches high or less.

2.4 LOCKS:

- A. Fabricate lockers to receive the following locking devices as scheduled, installed on lockers using security-type fasteners:
 - 1. Pad Locks: Provided by Owner.

2.5 LOCKER ACCESSORIES:

- A. Interior Equipment: Furnish each locker with the following items, unless otherwise indicated:
 - 1. Hooks: Manufacturer's standard zinc-plated, ball-pointed steel. Provide one double-prong ceiling hook, and not fewer than two single-prong wall hooks for single-, double-, and triple-tier units. Attach hooks with at least two fasteners.
- B. Number Plates: Manufacturer's standard etched, embossed, or stamped, aluminum number plates with numerals at least 1/4 inch high. Number lockers in sequence indicated. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
- C. Continuously Sloping Tops: Manufacturer's standard, fabricated from minimum 0.0359-inch- thick steel sheet, for installation over lockers with separate flat tops. Fabricate tops in lengths as long as practicable, without visible fasteners at splice locations, finished to match lockers. Provide fasteners, filler plates, supports, and closures, as follows:
 - 1. Closures: Hipped-end type.
 - 2. Sloped top corner fillers, mitered.
- D. Recess Trim: Manufacturer's standard; fabricated from minimum 0.0478-inch- thick steel sheet, minimum 2-1/2-inch face width, and finished to match lockers. Fabricate trim in lengths as long as practicable.
- E. Filler Panels: Manufacturer's standard; fabricated from minimum 0.0478-inch- thick steel sheet in an unequal leg angle shape, and finished to match lockers. Provide slip joint filler angle formed to receive filler panel.
- F. Finished End Panels: Manufacturer's standard; fabricated from minimum 0.0239-inch- thick steel sheet, finished to match lockers, and designed for concealing exposed ends of nonrecessed lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.6 LOCKER BENCHES:

- A. Bench Tops: Provide manufacturer's standard one-piece units, of the following material, minimum 9-1/2 inches wide by 1-1/4 inches thick, with rounded corners and edges:
 - 1. Laminated maple with one coat of clear sealer on all surfaces, and two coat of clear polyurethane on top and sides.
- B. ADA Benches: Provide manufacturer's custom one-piece units, of the following material, minimum 24-inches wide by 1-1/4 inch thick, with 1/4" radius rounded corners and edges:
 - 1. Fabricated ADA bench tops laminated maple.
 - a. Product: ADA Locker Room Bench with Back Support #; Robinson Steel Co., tel: (610) 279-6600, or equal.
 - b. Finish: Two coat laquer finish.
 - c. Bench Top Size: 24-inches by 48-inches.
 - d. Seat Height: 17-1/2 inches.

2.7 FABRICATION:

- A. Unit Principle: Fabricate each locker with an individual door and frame, individual top, bottom, back, and shelves, and common intermediate uprights separating compartments.
- B. Knocked-Down Construction: Fabricate lockers for nominal assembly at Project site.
- C. Fabricate lockers square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch. Weld frame members together to form a rigid, one-piece assembly.
 - 1. Form locker-body panels, doors, shelves and accessories from one-piece steel sheet, unless otherwise indicated.

2.8 FINISHES, GENERAL:

- A. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.
- B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- D. 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.
 - 1. Finish interior of locker in same color as exterior of locker.

2.9 STEEL SHEET FINISHES:

- A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-enamel finish consisting of a thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 1.4 mils on doors, frames, and legs, and 1.1 mils elsewhere.
- C. Powder-Coated Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard baked-polymer finish consisting of a thermosetting powder topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color: As indicated by referencing manufacturer's designations.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine concrete bases for suitable conditions where metal lockers are to be installed.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Install metal lockers and accessories level, plumb, rigid, and flush according to manufacturer's written instructions.
- B. Assemble knocked-down lockers with standard fasteners, with no exposed fasteners on door faces and face frames.
- C. Anchor lockers to floors and walls at intervals recommended by manufacturer, but not more than 36 inches o.c. Install anchors through backup reinforcing plates where necessary to avoid metal distortion, using concealed fasteners.
- D. Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed lockers with concealed clips.
 - 2. Attach sloping top units to lockers, with closures at exposed ends.
- E. Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed lockers.
- F. Anchor locker benches to floors Uniformly space pedestals not more than 72 inches apart, and securely fasten to bench top and anchor to floor.

3.3 ADJUSTING, CLEANING, AND PROTECTION:

- A. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.
- B. Clean interior and exposed exterior surfaces and polish stainless-steel and nonferrous-metal surfaces.
- C. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit locker use during construction.
- D. Touch up marred finishes, or replace locker units that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

3.4 METAL LOCKER SCHEDULE:

- A. Metal Wardrobe Corridor Lockers [**LOC-1**]: Where metal lockers of this designation are indicated, provide products complying with the following:
1. Locations: Corridors.
 2. Products: Available products include the following:
 - a. 15-inches deep by 15-inches wide, double tier, 2x36-inches high, "Heavy Duty Corridor" locker; Republic Storage Systems Co., Inc.
 3. Material: Cold-rolled steel sheet.
 4. Back-Material Thickness: 0.0239 inch.
 5. Side-Material Thickness: 0.0239 inch.
 6. Door-Material Thickness: 0.0747 inch.
 7. Door-Frame-Material Thickness: 0.0598 inch.
 8. Locker Fabrication: Knocked down.
 9. Locker Arrangement: Double tier.
 10. Backs: Solid.
 11. Sides: Solid.
 12. Door Style: Solid, perimeter venting.
 13. Shelves: Solid.
 14. Hinges: Standard hinge.
 15. Handles/Latches: Recessed.
 16. Locks: Padlocks, dead bolt.
 17. Accessories:
 - a. Base: 4-inch concrete with resilient base.
 - b. Sloping Tops: Required.
 - c. Recess Trim: As required.
 18. Color: As selected by Architect.
 19. ADA Accessible Lockers: Provide 5 % of each type and each color, handicapped accessible lockers with the following features:
 - a. 15-inches deep by 15-inches wide, "Heavy Duty Corridor" locker; Republic Storage Systems Co., Inc.
 - b. Book shelf and coat hooks shall be mounted 54 inches off the finished floor.
 - c. One additional shelf shall be placed near the bottom of the locker, at least 9 inches above the finished floor.
 - d. Placement of lockers within locker layout: The lockers must be in an unobstructed position that is at least 24 inches away from a wall or other obstruction or obstacle. The Space around the lockers must be clear within a 60 inch diameter turning circle to allow easy access and egress by parallel or frontal approach.
 - e. Reference Drawings for locations.

END OF SECTION 105113

SECTION 108400BIRD CONTROLPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Electrified tape bird deterrent systems.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Design, fabricate, and install solar powered bird deterrent strips in locations indicated and as directed by the Architect. Shock strip, connectors, supports and accessories shall withstand UV and weather exposure normal to the location where the project is located.

1.4 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, descriptions, hardware, fittings, and mounting accessories for bird control system.
- B. Shop Drawings: Show materials, fabrication, dimensions, mounting heights, clearances, and installation details for bird control system.
 - 1. Show locations for blocking, reinforcement, and supplementary structural support to be provided by others.
- C. Samples for Initial Selection:
 - 1. Samples of electrified tape colors for election by the Architect.
- D. Samples for Verification: For each of the following products and for full range of color, texture, and pattern variations required, prepared on Samples of size indicated below.
 - 1. Seam, Edge, and Corner Condition: Not less than 12-inch- (300-mm-) long section showing seam, edge, and corner treatment.
 - 2. Exposed Hardware Finishes: Manufacturer's standard-size unit, not less than 3 inches (76 mm) square.
 - 3. Accessories: Manufacturer's full-size unit.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For bird control system to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Licensed or certified by the manufacturer of the bird control system.

- B. Mockups: Before installing bird control system, build mockups to demonstrate aesthetic effects and set quality standards for materials, execution, fabrication, and installation.
 - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store bird control system in original shipping containers until ready.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of bird control system in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Where bird control system installation is indicated to fit to other work, verify dimensions of other work by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 BIRD CONTROL SYSTEM:

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Bird Jolt Flat Track; Bird-B-Gone.
 - 2. Bird Shock Flex Track; Bird Barrier America, Inc.
 - 3. Shock Tape Electric Bird Deterrent; Nixalite of America, Inc.
- B. Electrified Tape/Track: UV-stabilized PVC or acrylic base with copper or aluminum wire with pressure sensitive adhesive with peel of backing, or manufacturer's recommended primer and adhesive.
- C. Solar Charging System: Manufacturer's standard, 4.0VDC minimum input voltage, solar charging system.
 - 1. Output Voltage: 7.0 (+/-) 20% open circuit voltage intermittent DC current.
 - 2. Provide battery backup.
- D. Miscellaneous Accessories: Provide manufacturer's standard system of electrical wire connections between tracks and power source.
- E. Mounting System: Manufacturer's standard system of brackets, coils, springs, primers, sealers and adhesives, installed in accordance with manufacturer's written instructions.
 - 1. Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or noncorrodible units; weather-resistant, compatible, nonstaining materials. Provide as required for bird deterrent system mounting and secure attachment. Number as needed to comply with performance requirements and to minimize appearance; evenly spaced. Where exposed to view, with finish and color as selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, and other conditions affecting bird deterrent system.
 - 1. Remove bird droppings and debris with manufacturers recommended sanitizers and cleaners.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install bird deterrent system at locations and in position indicated, securely connected to substrate, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and manufacturer's written instructions.
- B. Install bird deterrent system after other finishing operations, including painting, have been completed.
- C. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing bird deterrent system to substrate and for properly transferring load to in-place construction.
- D. Parapets, copings and other locations where width is greater than 6-inches: Provide 2 rows of bird deterrent system and surfaces greater than 10-inches, provide three rows of bird deterrent system.
- E. Adjust components and accessories.

END OF SECTION 108400

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, include General and Supplementary Conditions and Division 01 Specifications sections, apply to work of this section. As defined, the coordinating trade shall be solely responsible for assigning and dividing the work among the trades as necessary to accomplish the requirements of the Contract Documents.

1.2 SCOPE

- A. Work in this Section includes furnishing of materials, accessories, and special services necessary to complete foodservice equipment work as Specified herein and where show, scheduled, or reasonably inferred in the Contract Documents.
- B. Provide all labor, materials, services and transportation required to install and complete all Foodservice Equipment indicated on the Contract Documents, ready for final connection by other trades. Include work specified, shown or reasonably implied as part of Foodservice Equipment.
- C. Portions of this work may be sub-contracted to those qualified to do such work, as may be necessary because of jurisdictional trade agreements and restrictions.
- D. Requirements of this Project include minimal inconvenience to the Owner and no interruption in foodservice operations. Submit proposed schedule of sequence and operation, for foodservice equipment removal and/or installation, for approval prior to starting work.
Relocation of existing foodservice equipment, from existing kitchen, must be done after new kitchen is completed and occupied. Installation of existing equipment, in new kitchen, must be coordinated with Owner.
- E. Foodservice Equipment Contractor shall submit itemized pricing for each piece of equipment, including separate total prices for delivery and installation. Include all taxes which are applicable to this project as a separate charge. Include all figures in the grand total price of bid proposal.

1.3 RELATED DIVISIONS / SECTIONS

- A. Division 03:
01 Floor depressions, reinforced concrete wearing bed and interior finished floor with coved base at prefabricated cold storage assemblies.
- B. Division 03:
01 Floor depressions shown this Section with smooth-finished, coved trench drain interior, perimeter angle frame and removable grate-sections.
- C. Division 22:
01 PVC conduit with pull-wire and wide-sweep bends for remote beverage dispensing systems.
- D. Division 23:
01 Supply and exhaust fans for foodservice equipment and exhaust hoods.
- E. Division 22:
01 Mechanical and Plumbing roughing-in, inter-connection and final connection to Foodservice Equipment and Cold Storage Assemblies.

- F. Division 26:
 - 01 Electrical roughing-in, inter-connection and final connection to Foodservice Equipment and Cold Storage Assemblies.

- G. Division 06:
 - 01 Millwork fixtures (i.e., front/back bars, service stations, etc.).

1.4 CODES, REGULATIONS AND STANDARDS

- A. Foodservice Equipment and installation work must comply with applicable laws, statutes, building codes, regulations of public authorities and with the following:
 - 01 ADA - Americans with Disabilities Act
 - 02 AGA - American Gas Association Laboratories.
 - 03 ANSI - American National Standards Institute.
 - 04 ASHRAE - American Society of Heating, Refrigeration and Air Conditioning Engineers.
 - 05 ASME - American Society of Mechanical Engineers.
 - 06 HACCP - Food and Drug Administration Hazard Analysis Critical Control Points Guide lines.
 - 07 NEC - National Electric Code.
 - 08 NFPA - National Fire Protection Association.
 - 09 NSF - National Sanitation Foundation (equipment to bear certification label).
 - 10 OSHA - Occupational Safety and Health Administration
 - 11 SMACNA - Sheet Metal and Air Conditioning Contractor's National Association.
 - 12 UL - Underwriters' Laboratories, Inc.(equipment to bear certification label).

- B. Furnish certification of regularly-manufactured equipment listing or classification by Underwriters' Laboratories, Inc. with initial submittal.

1.5 CONTRACTOR'S QUALIFICATIONS

- A. Foodservice Equipment Contractor's qualifications:
 - 01 Five (5) years continuous operation under the same name and ownership.
 - 02 Successfully completed three (3) similar-size and type of projects within the last five (5) years. Submit list with names and telephone numbers of Owner, Architect, Foodservice Consultant, and General Contractor.
 - 03 Technical staff experienced in the preparation of Submittal Data per Article 1.8
 - 04 Technical staff experienced in the procurement and installation of Foodservice Equipment specified in the Contract Documents.
 - 05 Manufacturer's authorization to purchase, distribute and install equipment as specified.

- B. Sub-Contractors and Fabricators qualifications:
 - 01 Sub-contractors and Fabricators employed by this Contractor shall comply with Paragraph A of this Article.

1.6 SUBSTITUTIONS

- A. Base Bid:
 - 01 Shall consist of equipment items, components and accessories identified in the Contract Document .
 - 02 No "Alternates" or "Substitutions" will be considered in Base Bid.
 - 03 All other manufactures, including any brands which may be listed as "Alternates" or "Approved Equal" must meet or exceed specifications, size, accessories, materials, finishes, etc. of the specified brand.
 - 04 Equipment of similar type, group or category (ranges, ovens, kettles, refrigerators, etc) shall be built by the same manufacturer.

- B. Proposed Substitutions:
 - 01 Submit proposed substitutions on bidders letter head no less than 10 calendar days prior to Bid Date.
 - 02 Submit proposed substitutions with specification data and/or manufacturer's shop details indicating all features and accessories required to conform with specified equipment.
 - 03 Provide a line item list of any deviations from the specified equipment. List of deviations must include equipment description, equipment manufacture's name, model, accessories and features.
 - 04 Deviation(s) must be noted for both specified and proposed alternate equipment.
 - 05 Equipment without listed deviation(s) will be considered to be furnished as specified.
 - 06 Alternate equipment must meet or exceed specifications in size, construction, materials, finishes, function, features, and accessories.
 - 07 Above requirements apply during bidding and contact negotiations.
 - 08 Requests for approval of proposed substitutions will be responded to by Addendum.

- C. Substitutions with Prior Approval:
 - 01 Submit on Bidder's letterhead and attach to Proposal Form.
 - 02 Include individual totals with additive or deductive amounts stipulated and the documentation required in Paragraph B-02.
 - 03 Owner reserves right to accept or reject any or all substitutions proposals before execution of Contract.
 - 04 Provide all design and engineering services required to make adjustments in space, systems, or utilities.

 - 05 Contractor will pay all additional costs of utilities, construction or professional services incurred due to acceptance of any substitution.

1.7 CLARIFICATION OF DOCUMENTS

- A. Document Verification:
 - 01 Verify and coordinate all items provided in this Section to assure there are no discrepancies or conflicts.
 - 02 Coordinate drawings, specifications, manufactures requirements, submittals, actual site conditions, adjacent items, and associated work.
 - 03 Verification to include, but not limited to, quantities, dimensions, clearances required, direction of operation, door swings, utilities, fabrication details and methods and installation requirements.

- B. Document Discrepancy:
 - 01 Request clarification where discrepancies are discovered between drawings and specifications regarding quality or quantity.
 - 02 Prior to receiving clarification use the higher quality or greater quantity in Base Bid Proposal.

- C. During Bidding:
 - 01 Questions and comments pertaining to Construction Documents' clarity or intent will be responded to by Addendum.
 - 02 Direct all questions and comments to the attention of the Architect.

- D. Subsequent to Award:
 - 01 Confirmation of Construction Document requirements will be provided by Bulletin.
 - 02 Requests For Information Bulletins submitted by Contractor shall contain proposed resolution.

1.8 SUBMITTAL DATA

- A. Preliminary Submittal:
 - 01 Three (3) copies of equipment brochures.
 - 02 One (1) reproducible and two (2) prints of all roughing-in and fabrication shop drawings.
 - 03 Submit directly to Architect within four weeks after award of contract or issuance of letter of intent.
 - 04 Prints shall be completely legible with black line and white background.
 - 05 **Partial submittals will not be accepted or processed, without prior approval.**

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- B. Electronic Submission:
- 01 Submittal data can be submitted electronically, in PDF format only, if acceptable to the Architect.
 - 02 Only black line drawings will be accepted.
 - 03 Drawing file names must contain equipment item number(s) and submission date.
 - 04 Submit drawing files separated into the following categories: rough-in drawings, fabrication drawings, walk-in and refrigeration drawings, ventilator drawings and other equipment requiring shop drawings.
 - 05 Drawings submitted with all categories in one (1) file will be rejected.
 - 06 Data must be submitted per requirements specified in this Article and the Contract Documents.
- C. Brochure Format:
- 01 Cover:
 - a. Front and rear protective cover labeled with project name.
 - b. Front sheet indicating name and address of project, Architect, Foodservice Consultant, General Contractor and Foodservice Equipment Contractor.
 - 02 Table of Contents:
 - a. Include table of contents listing Area designation or Room number, item number, quantity, description and manufacturer.
 - 03 Cover Sheet:
 - a. Provide separate cover sheet for EACH ITEM NUMBER, component or equipment.
 - b. Include item number, description, quantity, manufacturer, optional equipment, modifications, special instructions and utility requirements.
 - c. Items of equipment containing, sub-assemblies or components shall have a separate cover sheet for each sub-assembly or component and shall be listed as secondary items in parenthesis beside primary item description.
 - 04 Specification Sheets:
 - a. Submit catalog specification sheet and/or manufacturer's shop drawing with sub-assemblies and components.
 - b. Photocopies are acceptable providing they are completely legible and contain data as shown on original catalog sheet.
 - 05 Shop Drawings:
 - a. Submit manufacture's shop drawings for flight type dishwashers, dishwashing systems, conveyors, soiled tray return systems, roll-in proofers, roll-in ovens, reel ovens, walk-in cold storage assemblies, utility distribution systems, utensil washers and ventilators.
 - b. Submit arrangement drawing (plan view and elevation) for underbar equipment.
 - 06 Certification Letter:
 - a. Submit, upon request, a certification letter of equipment listing or classification by Underwriters' Laboratories, Inc..
 - 07 Samples:
 - a. Submit samples, from manufacture's available colors, for equipment specified to have color.
- D. Rough-In Drawings:
- 01 Document Size:
 - a. Drawing sheet same size as Contract Documents. Drawings are not to be traced, reproduced or reproduced using electronic files.
 - 02 Electronic Drawing Files:
 - a. Contractor's use of electronic files of Contract Drawings for basis of producing submittal drawings is prohibited.
 - b. Contractor's using these files assumes total liability and responsibility for accuracy, conformance and verification with the latest Architectural and Engineering drawings, actual field conditions, and all equipment provided.
 - c. Contractor further assumes responsibility for coordination of their submittals with those of other Contractors and Sub-Contractors.

- 03 Scale:
 - a. Provide 1/4" scale drawing of foodservice equipment and cold storage assemblies with itemized schedules.
- 04 Special Condition Location Drawing:
 - a. Floor depressions, cores, sleeves or block-outs.
 - b. Concrete or masonry platforms.
 - c. Pipe sleeves or roof jacks.
 - d. Wall-openings or block-outs for pass-through equipment, recessed panels, in-wall system components, etc.
 - e. Wall blocking grounds or anchor plates required for equipment support/attachment.
 - f. Above-ceiling hanger assemblies for support of exhaust hoods, utensil-racks, etc.
 - g. Access panels in walls or ceiling for servicing equipment.
 - h. Ceiling pockets or recesses for high equipment.
- 05 Electrical Rough-In Drawing.
- 06 Plumbing Rough-In Drawing.
- 07 Mechanical Rough-In Drawing.
- 08 Required Information:
 - a. Foodservice equipment shown on Contract Drawings.
 - b. Cold storage assemblies and conveyor dishtable assemblies shown on Contract Drawings.
 - c. General-use and convenience utilities or services indicated on Contract Drawings, including those required by or connected to equipment or devices not in this Section.
 - d. Rough-ins for equipment shown on Contract Drawings including those labeled Not In Contract, By Owner or Future.
 - e. Rough-in drawings shall be fully dimensioned from finished-room surface to point of stub-up and/or stub-out (not to connection point on equipment) for all mechanical, electrical and plumbing services.
 - f. Coordinate connection number, tag system, and symbols with Contract Drawings.
- E. Shop Drawings:
 - 01 Document Size:
 - a. Drawing sheet same size as Contract Documents. Provide 3/4" scale for plan view and elevations; 1-1/2" scale for sections and construction details.
 - 02 Required Information:
 - a. Include Item Number, description and quantity.
 - b. Illustrate construction details, sections and elevations that reflect requirements of Specifications and Drawings.
 - c. Include all information, details and elevations, necessary for production of product, without additional instruction.
 - 03 Custom Fabricated Equipment:
 - a. Submit shop drawings for dishwashing systems, walk-in cold storage assemblies, ventilators and specialized equipment consisting of multiple components including serving lines. Submit arrangement drawing (plan view and elevation) for underbar equipment.
 - b. Indicate manufacture and model numbers of all ancillary components that are part of the fabricated equipment, faucets, drains, drawers, gussets and feet.
 - c. Illustrate floors, walls, columns and equipment where adjacent to the fabricated fixtures. Illustrate ceilings when clearance or interface is critical to the equipment.
 - d. Provide outline of all equipment set on, built into or under the fabricated equipment including trash can, knife holder, carts parked in or under equipment and built-in ice bins whether furnished by Foodservice Equipment Contractor or Owner.
 - e. Coordinate fabrication shop drawings with drawings of ancillary components incorporated into the equipment including food guards. Components are to be indicated on the fabrication shop drawings.

- f. When production food guards are specified, counter and food guard shop drawings must be coordinated and match design intent. Dimensions should be coordinated, with counter conditions and post locations. Final adjustments can be made during engineering of counter, as long as changes maintain design intent.
 - g. Indicate mechanical or electrical operating components integrated into fabricated fixtures. Include ventilation and service access required or recommended by manufacturer for service. Access panel size and placement is to permit good ventilation, easy access for lubrication, adjustment or replacement of parts.
- 04 Submit samples for color selection(s), when required.
- F. Submittal Procedure:
- 01 Approved Submittal:
 - a. Follow routine procedures specified in the General and Supplementary Conditions, General Documents or as directed.
 - b. After return of one copy of preliminary submittal, if all or any part has been rejected, resubmit as instructed for approval.
 - 02 Repetitive Review:
 - a. Contractor is to thoroughly review all data and material for compliance prior to submittal. Repetitive review time incurred by Consultant due to the Contractor's failure to comply with this requirement may be invoiced to this Contractor at Consultant's standard hourly rates.

1.9 VERIFICATION AND COORDINATION

- A. Utilities Rough-In Drawings:
- 01 Within four weeks after award of contract or notice-to-proceed, review Contract Documents and Submittal Data for accuracy and completeness.
 - 02 Coordinate work with other sub-contractors and field-check installed utility locations and capacities.
 - 03 Submit written notification to Architect of conflicts and required adjustments.
- B. Review Critical Systems/Components:
- 01 Ventilator - removal/supply air volume, velocity, static pressure, duct collar sizes and location.
 - 02 Refrigeration Systems - compressor, condenser and evaporator.
 - 03 Ventilator Fire Suppression Systems - nozzle locations, air handler, fuel interlocks, piping and distance limitations.
 - 04 Utility Service Lines - gas, water, steam condensate line sizes and manifold configurations.
 - 05 Fabricated Equipment Load Center Panels - individual and total amperage calculations and circuit balance.
- C. Dimension Responsibility:
- 01 Critical Dimensions:
 - a. Attain actual measurements for proper fit of equipment. When actual measurements for proper fit are not available, in time to meet the required delivery schedule, Contractor must provide, to General Contractor, accurate equipment templates.
 - b. Templates constructed of stable material, for equipment that requires precise area requirements, so building walls and floors can be constructed to accommodate equipment. Mark exact location of front and back edges of toe base on top of template and show dimension of toe base set back. Coordinate template delivery time with General Contractor and provide use instructions for templates.
 - c. Indicate on shop drawings, equipment requiring templates, that templates are being provided.
 - d. Dimensions in Contract Documents are approximate and are as accurate as can be determined. Field-check all measurements and conditions at building prior to fabrication or delivery of equipment.
 - e. Submit written notification to Architect of all conflicts or deviation from dimensions shown.

- 02 Fabricated Equipment Fit:
 - a. Proper fit of fabricate equipment to walls, adjacent equipment and equipment fitting contour of walls including fitting corners at angle of walls, is a maximum gap of 1/4".
 - b. Failure to obtain proper fit of equipment may result in rejection of equipment.
 - c. Excessive use of trim pieces will not be acceptable.
- 03 Engineered Stone Fit:
 - a. Proper fit of stone or engineered stone tops with exposed edges to walls, adjacent equipment and tops fitting contour of walls including fitting corners at angle of walls, is maximum gap of 3/32".
 - b. Failure to obtain proper fit of exposed tops and edges may result in rejection of top.
 - c. All sealants used to trim tops to adjacent surfaces and seal joints must be color matching.
- D. Building Access:
 - 01 Equipment must be fabricated for passage through finished openings.
 - 02 Schedule construction of walls or partitions prior to delivery of fixed equipment if required to fit through finished openings.
 - 03 Contractor to maintain contact with project and be knowledgeable of all conditions including vertical handling limitations within building and possible hoisting requirements.
 - 04 Coordinate all procedures with General Contractor.
- E. Storage Areas:
 - 01 Coordinate dimensions to accommodate scheduled modular shelving sections.
 - 02 Submit written notification to Architect of variance between Contract Documents and actual conditions.
- F. Color/Pattern Selections:
 - 01 Submit samples of engineered stone, plastic laminate, paint finishes and vinyl-coated surface material of equipment for verification and selection by Architect.
- G. Size/Weight Coordination:
 - 01 Verify serviceware size/weight information with Owner.
 - 02 Coordinate information with silverware dispensers, self-leveling dispensers and transport equipment.
- H. Movable Equipment:
 - 01 Mobile equipment required to fit through or into fixed equipment is to be reviewed and coordinated for compatibility at time of submittal preparation. Submit written notification of conflicts and required adjustments.
- I. Relocation of Work:
 - 01 Relocate or re-route work as required to coordinate with construction schedule without charge.

1.10 WARRANTY

- A. Unless otherwise noted in General provisions of Contract, including General and Supplementary Conditions and General Documents, items furnished are to be fully guaranteed against defects in workmanship, materials, and functionality as follows:
 - 01 One (1) year from date of Substantial Completion
 - 02 Four (4) year extended replacement warranty on all refrigeration compressor units.
 - 03 Warranty periods are from date of Substantial Completion or issue date of Certificate Of Occupancy.
 - 04 Should Temporary Certificate of Occupancy be issued for partial completion of work, items furnished within that designated area are to be under warranty from date of Certificate.
- B. Parts and Labor Warranty:
 - 01 Provide manufacture's written parts and labor warranty, for all equipment furnished in this section.
 - 02 Provide one (1) year service available within twenty-four hours of notification for refrigeration systems and/or equipment. First year labor costs covered by Warranty.

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- C. Walk-in Cold Storage Assembly and Refrigeration System(s):
 - 01 One (1) year refrigeration service, at no charge, available within twenty-four hours of notification.
 - 02 Five (5) year manufacture's registered written replacement, warranty certificate, covering compressor bodies. First year labor costs covered by Warranty.
 - 03 Ten (10) year manufacture's registered written replacement/repair, warranty certificate, covering walk-in panels. Warranty to cover defects in material and workmanship. First year labor costs covered by Warranty.
 - 04 One (1) year parts and labor warranty for all components of refrigeration system(s) and walk-in vault(s) not otherwise covered herein.
- D. Non-Warranted Items:
 - 01 Components of equipment subject to replacement prior to one-year's use and items which may fail due to improper or inadequate periodic maintenance are not intended to be included within this warranty.
- E. Service Agencies:
 - 01 Furnish a list of all equipment and its respective local service agent, per Article 3.4 OPERATION AND MAINTENANCE MANUAL.

PART 2 - PRODUCTS

2.1 MATERIAL/COMPONENTS

- A. Stainless Steel Sheets:
 - 01 18-8, Type 304, polished to 180 grit, No. 4 finish.
 - 02 Stainless steel joints and seams:
 - a Heli-arc welded, free of pits, flaws, ground smooth and polished to No. 4 finish.
 - 03 Stainless steel horizontal surfaces:
 - a Grain direction is longitudinal including backsplash.
 - b Right-angle corners of fixtures shall be polished to provide a mitered appearance.
- B. Galvanized Iron Sheets:
 - 01 Armco copper bearing Zinc Grip or Zinc Grip/Paint Grip.
 - 02 Galvanized iron joint and seams:
 - a Arc-welded, free of pits and flaws and ground smooth.
 - 03 Galvanized sheets or shapes:
 - a Washed with mineral spirits and primed with Rustoleum enamel in color selected by Architect.
- C. Sound Deadening:
 - 01 Component Hardware "Tacky Tape" 3/4" wide rope:
 - a Position continuously between all underbracing or frame members and underside of stainless steel surface.
 - b Tighten stud-bolts for maximum compression of sealant and trim excess.
- D. Plastic Laminates:
 - 01 Color/pattern as selected by Architect.
 - 02 1/16" thickness for flat surfaces.
 - 03 1/32" thickness for radius surfaces.
 - 04 Plastic laminates and adhesives must be N.S.F. approved and comply with Standard No. 35.
- E. Engineered Stone:
 - 01 Fabricator and installer must have attended a manufacture's accredited training seminar for specified product, within the last two (2) years.
 - 02 All cuts must be done with a water jet cutter or router and finger bits. No saw cuts allowed.
 - 03 All joints must be joined with color matched adhesive, manufacture approved, for use with specified product.

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- 04 All joints are to be hairline and flush with adjacent surfaces. Shim stone with metal shims to level surfaces.
- 05 Stone fabrication and installation must be per manufacture's recommendations.
- 06 Stone must be installed on underlayment meeting manufacture's recommendations.

F. Casters:

- 01 Open Base Fixtures:
 - a Provide Jarvis & Jarvis model 5-S40-213GP-19A, 5" dia., stem mounted, NSF approved, ball bearing, 300lb. capacity, swivel casters with stainless steel yokes, polyolefin wheels and grey polyurethane tires.
 - b Unless otherwise specified provide two (2) casters with model SS-E65 brakes.
 - c Provide all casters with Component Hardware model C60-1012, 7" rolling bumpers with stainless steel top discs.
- 02 Closed Base Fixtures:
 - a Provide Jarvis & Jarvis model 5-S30-213GP-2, 5" dia., plate mounted, NSF approved, ball bearing, 300lb. capacity, swivel casters with stainless steel yokes, polyolefin wheels and grey polyurethane tires.
 - b Unless otherwise specified provide two (2) casters with model SS-E65 brakes.

G. Cutting Boards:

- 01 Read Products, Inc. "Richlite" reversible boards, 3/4" thick, size as indicated.

H. Identification Plates:

- 01 Prohibited Information:
 - a Names of suppliers and contractors.
- 02 Required Information:
 - a Function or purpose of controls and switches.
- 03 Plate Construction:
 - a Engraved phenolic plastic, secured to equipment with epoxy cement or stainless steel screws. Furnish samples.

2.2 PLUMBING/MECHANICAL REQUIREMENTS

A. Plumbing Fittings, Trim and Accessories provided this Section:

- 01 Control valves, vacuum breakers, pressure regulators for water, gas, and steam as required for operation of Foodservice Equipment.
- 02 Plumbing fittings and components to be chrome-plated where exposed.
- 03 Specialty water-fill faucets or hose assemblies per Contract Documents.
- 04 Shock absorbers for Foodservice Equipment with quick-opening or solenoid-operated water valves.
- 05 Piping supports and brackets within fabricated equipment.
- 06 Open Base Fixtures:
 - a Mount control valves on 14 gauge stainless steel panel with 2-1/2" setback from counter top edge/rim to control handle.
 - b Submit design for approval.
- 07 Closed Base Fixtures:
 - a Removable 18 gauge stainless steel closure panel mounted under top at plumbing penetrations.
- 08 Extensions of indirect waste fittings to floor sink and floor drains from sinks, serving counters, and under bar equipment furnished and installed by Division 22.
- 09 Drain lines painted with aluminum paint where exposed.

B. Final Plumbing Connections:

- 01 Pre-pipe fabricated equipment containing components, fittings and/or devices required to be connected to building systems.
- 02 Pre-pipe each component, fitting or device to a utility compartment for final connection. Refer to Utility Connection Plan for capacities.

- 03 Field-assembled equipment shall have plumbing components completely interconnected under this Section ready for final connection as indicated on Utility Connection Plan.
- 04 Tag plumbing final connection points of equipment with the following:
 - a Item number.
 - b Name of devices or components.
 - c Type of utility.

C. Ducts:

- 01 Exhaust Hoods mounted below finished ceiling:
 - a Furnish 18 gauge stainless steel seamless duct risers for final connection to exhaust hoods.
 - b Extend duct risers 6" above finished ceiling.
 - c Trim duct at ceiling with 16 gauge stainless steel angle flange with welded corners.
- 02 Exhaust Hoods mounted in finished ceiling:
 - a Furnish 18 gauge stainless steel 2" high duct collar for final connection to duct system for exhaust hoods which are furred-in to ceiling.
 - b Trim hood at ceiling with 16 gauge stainless steel angle flange with welded corners.
- 03 Warewash Equipment:
 - a Furnish 18 gauge stainless steel seamless duct risers for final connection to warewash machines equipped with integral vent cowls or extended hoods.
 - b Extend duct risers 6" above finished ceiling.
 - c Trim duct at ceiling with 16 gauge stainless steel angle flange with welded corners.

2.3 PLUMBING TRIM

A. Faucets:

- 01 Furnish for sinks or equipment specified under this Section requiring open water supply.
- 02 Faucets furnished under this Section to be lead free and comply with ANSI/NSF Standard 61, Section 9 requirements.
- 03 Faucets specified in 2.15 FOODSERVICE EQUIPMENT SCHEDULE.

B. Drains:

- 01 Furnish for sinks or equipment specified under this Section requiring removal of liquids.
- 02 Furnish with connected overflows for sinks specified under this Section.
- 03 Install specified chrome-plated or stainless steel fittings with washers and locknuts in die-stamped opening.
- 04 Drains specified in 2.15 FOODSERVICE EQUIPMENT SCHEDULE.

2.4 ELECTRICAL REQUIREMENTS

A. Certification:

- 01 Certify electrical systems, components and accessories specified under this Section to be in compliance with NEC 70.

B. Electrical Components:

- 01 Coordinate foodservice equipment voltage, phase and loads with building system. Confirm existing equipment electrical requirements.

C. Cord and Caps:

- 01 Coordinate Foodservice Equipment cord/caps with related receptacles.
- 02 120 volt equipment shall have Type S0 or SJ0 cord and plug with ground wire fastened to frame/body.
- 03 Adjust cord lengths on fixed equipment to eliminate loose-hanging excess.

D. Controls:

- 01 Provide motor-driven appliance or electrically-heated unit with control switch or starter per Underwriters' Laboratories, Inc. with low-voltage and overload protection.

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- 02 Provide NEMA Type 4 enclosure with remote manual starters, magnetic contactors or starters and push-button stations. NEMA Type 1 enclosure only when installed in a closed base body.
 - 03 Provide 208/240 volt and 460/480 volt equipment or devices with integral, pre-wired step-down transformer to supply 120 volt control circuit.
- E. Motors:
- 01 120 volt motors:
 - a Manual tumbler type starter with thermal overload protection and interchangeable heating elements.
 - 02 208/240 volt and 460/480 volt motors:
 - a Magnetic starter with low-voltage protection and one interchangeable overload relay per phase.
- F. Heating Elements:
- 01 Electrically-heated equipment:
 - a Thermostatic controls.
 - 02 Water heating equipment:
 - a Equipped with positive low-water shut-off.
- G. Receptacles:
- 01 Closed Body Base Receptacles:
 - a Mount in Component Hardware model R73-1210 recessed housing.
 - b Pre-wire receptacles in closed body base to a junction box installed within 6" above bottom of utility or compressor compartments.
 - 02 Open Body Base Receptacles:
 - a Mount on 14 gauge stainless steel panel, 12" x 10-1/2" x 4-1/2" deep, with returned ends and sloping recess. Submit design for approval. Secure panel to underbracing of top.
 - b Pre-wire receptacles on open body base fixtures, to a junction box, mounted on underside of lower shelf. Install vertical wiring in rigid conduit or within tubular leg.
 - 03 Fabricated Equipment Receptacles:
 - a Hubbell, Inc. assemblies horizontally-mounted in a metal box with stainless steel cover plate installed in/on fabricated equipment.
 - 04 Fabricated Equipment Switches:
 - a Hubbell, Inc. with metal box and Sierra Model NO. C-361 stainless steel cover plate installed in/on fabricated equipment.
- H. Load Centers:
- 01 Pre-wire load centers installed on fabricated equipment to have all fixture components wired to load center with balanced phase loading.
 - 02 List all breaker/device information, typewritten, on circuit schedule in load center door with enclosed schematic wiring diagram of fixture components.
 - 03 Mount load center(s) within utility compartment(s), per code requirements.
 - 04 Load center wired complete and ready for final connection by Division 26.
- I. Light Fixtures:
- 01 Fabricated Equipment:
 - a Pre-wire light fixtures with lamps installed in/on fabricated or field-assembled equipment to a junction box for final connection. Install light fixtures in continuous-run when specified.
 - b Display light fixtures installed with stud bolts full-length of display stand and serving shelf. Pre-wire through support posts to an apron-mounted switch.
 - c Heat lamps installed with stud bolts to underside of serving shelf. Provide maximum length lamp chassis, when multiple heat lamps are specified. Install switches and infinite controls remote from lamps.
 - 02 Cold Storage Assembly:
 - a Connect cold storage light fixtures through hub fitting located on top of fixture. Seal hub, airtight at exterior side of walk-in panel.

- b Install all horizontal conduit above ceiling panels. Install plastic sleeve through ceiling panels for electrical conduit. Seal sleeved penetrations airtight at both sides of panel.
- 03 Lamps:
 - a Install bulbs in Foodservice Equipment containing a light fixture.
 - b Provide G.E. Model No. 40A15 appliance bulbs for refrigerated and heated cabinets.
 - c Provide Shat-R-Shield lamps or standard lamps sleeved with end caps for exposed fluorescent or LED lamps within a food zone.
- J. Final Electrical Connection:
 - 01 Fabricated Equipment:
 - a Pre-wire fabricated equipment containing electrically-operated components, fittings and/or devices which are direct-connected to building systems. Pre-wire each component, fitting or group thereof to a junction box for final connection. Refer to drawings for circuit loading.
 - b Fabricated equipment containing electrically-operated components and/or devices indicated to have a circuit-breaker load center shall have each component or device pre-wired to a separate circuit breaker for balanced phase loading and single final connecting point.
 - 02 Field-Assembled Equipment:
 - a Pre-wire electrical components completely to single connecting point(s) as indicated on Utility Connection Drawings.
 - 03 Cold Storage Assembly:
 - a Prewire electrical devices of cold storage assembly to a top-mounted junction box for final connection per compartment grouping.
 - b Light fixtures, switches and heated pressure-relief vent.
 - c Door/jamb heaters and temperature monitors/alarms.
 - 04 Tag electrical final connection points of equipment with the following:
 - a Item number.
 - b Name of devices on circuit.
 - c Total electrical load.
 - d Voltage and phase.

2.5 FABRICATED EQUIPMENT AND FIXTURES

- A. Approved manufacturers of fabricated food service equipment:

Jero Manufacturing, Inc.
5117 South 100th E. Ave.
Tulsa, Oklahoma 74145

Keas Stainless Steel Fabricators, Inc.
4312 S.E. 31st
Del City, Oklahoma 73115

Kemlee Manufacturing, Inc.
1404 Industrial Park
Galena, Kansas 66739

Complete Restaurant Services
2668 Myrtle Springs Avenue
Dallas, Texas 75220

- B. All fixtures within this Section are to be constructed by single manufacturer and of uniform design and finish.
- C. All custom fabricated equipment must be built in NSF approved shop and bear NSF label.

- D. All custom fabricated refrigerated equipment must be built in NSF approved shop, meet NSF-7 standards and bear NSF label.
- E. All custom fabricated equipment with electrical and/or plumbing components must be built in U.L. approved shop and bear U.L. mark, manufacture's name, word "LISTED", product name and control number. U.L. mark must be U.L. approved label with manufacture's name, U. L. identification, address and electrical characteristics pre-printed on label. Install label where accessible for viewing but not where it will receive abuse. Fabricated equipment electrical systems must comply with federal, state and local codes and regulations.
- F. Pre-wire counter and components to circuit breaker load centers in utility compartment. Square D QO series, circuit breaker load center with main breaker, cover, ground bar kit and Visi-trip breakers. Load center to have 20% spare capacity.

2.6 FIELD JOINTS

- A. Field Joints:
 - 01 Provide field joints only when equipment size must be limited for access into building.
 - 02 Stainless steel surfaces (tops, edges, splashes) must be fully welded, ground and polished to match finish of adjacent surface.
 - 03 Note field joint type and location on shop drawings.
- B. Vertical Joints:
 - 01 Terminate field weld 1" above horizontal cove at inaccessible vertical field joints in backsplash of fixture.
 - 02 Remaining height of field joint is to be a hairline butt joint with rear mounted offset draw-angles.
- C. Closed Body Base:
 - 01 Joints shall be draw-type with hairline seams fully field-welded.
- D. Plastic Laminate:
 - 01 Joints shall be doweled, glued and draw-bolted with fasteners.
 - 02 Carefully match laminate patterns.

2.7 HOT FOOD WELLS

- A. Vertical Mounted Controls:
 - 01 Remote mount hot food well controls in vertical recessed apron panel.
 - 02 Apron panel is recessed 2" from body line.
 - 03 Mount apron panel on concealed piano hinge at bottom edge; secure with screws at upper corners.
- B. Installation:
 - 01 Bottom mount hot food wells into 12" x 20" die-stamped top openings.
 - 02 Turn top flange down into hot food well.
 - 03 Apply high temperature Silicone sealant around hot food well and flange forming complete seal and thermal break.
 - 04 Sealant must have minimum 450°F rating.
 - 05 Install wells per manufactures recommendation.
- C. Automatic Water Fill:
 - 01 Inter-connect hot food well drain lines to share "AutoFill" option where specified.
- D. Drains:
 - 01 Manifold hot food well drains and extend to within utility compartment for indirect waste connection.
 - 02 Install valve in drain line and extend handle through compartment door or as specified in this Section.

03 Provide individual brass or hi-temp plastic "pull-out" drain plugs for each food well.

E. Enclosure:

01 Enclose underside of hot food wells with removable 18 gauge stainless steel louvered panel. Louver panel with 10% open area per lineal foot.

F. Plate Shelf:

01 Provide 14 gauge stainless steel 9" deep plate shelf full-length of hot food station, per detail.

02 Set shelf 10" below counter top with rear panel covered up to underside of counter top.

03 Turn end panels up square.

04 Turn front of shelf down 1" and return under for closure panel attachment.

2.8 VENTILATOR FIRE SUPPRESSION SYSTEM

A. Installation:

01 Install fire suppression system(s) in ventilators specified in this section.

02 Install in accordance with manufacturer's recommendations and applicable codes or standards.

03 Submit installation certification to Architect.

B. Automatic Chemical System:

01 Install automatic chemical system in each filtered exhaust hood and duct assembly.

02 Provide surface protection above/in all equipment required by NFPA Bulletin No. 96 and local Fire Marshall's regulations.

03 Refer to Contract Drawings for quantity of exhaust fan units serving single or multiple exhaust hoods and coordinate with hood/fan controls.

C. Cylinder Location:

01 Locate chemical cylinders (within recessed 18 gauge stainless steel cabinet with Lexan hinged door)] as indicated on drawings.

02 Install piping to exhaust hood(s) in totally-concealed manner.

03 Set top of cylinder cabinet flush with finished ceiling.

04 Provide polished chrome plated tubing piping and fittings, where exposed at cylinder cabinet and interior of exhaust ventilator.

05 Exposed pipe threads are not allowed in or above food zone

D. System Components:

01 Ansul Model No. "PIRANHA", system assemblies, in system increments required by dimensions and configuration of foodservice equipment and ventilators.

02 System to comply with U.L. 300 test standards and bear label.

E. Remote Release:

01 Remote manual release located in path of egress from protected exhaust hood area.

02 Install all conduit and remote pull so only face of pull is visible in wall.

F. Control System:

01 Ansul Automan cylinder control assembly with four (4) snap-action electric switches.

G. Fusible Links:

01 Fusible links installed each duct collar of filtered hood/ducts.

02 Fusible links located directly above each cooking appliance required by Code, in quantity required by length of protected appliance.

H. Discharge Nozzles:

01 Provide High Proximity nozzles above each cooking appliance required by Code.

02 Provide nozzle model P34 / P41 per manufacturers recommendations.

03 Minimize length of drop piping to nozzle.

I. Fitting Adaptor:

01 Provide "Quik-Seal" adaptor fitting at all ventilator penetrations for distribution pipes or detection lines.

J. Gas Valves:

01 Provide required quantity and sizes of mechanically-operated gas valves.

2.9 COLD STORAGE ASSEMBLIES

A. Sectional Assemblies:

01 Provide sectional assemblies in size/shape as indicated on drawings, 8'-6" AFF unless otherwise specified.

02 Door locations and size per Contract Documents.

B. Panel Insulation:

01 Class 1 Urethane with vapor barrier, 4" thickness with minimum of R-32 rating.

a Insulation shall have a flame spread index of 25 or less and smoke development index of not more than 450.

C. Panel Material/Finish:

01 .040" thick stucco-embossed aluminum interior walls and exterior panel surfaces.

D. Ceiling Material/Finish:

01 24 gauge smooth galvanized steel with baked white polyester finish on interior ceilings.

E. Panel Protection:

01 Provide protective covering on walls during installation of concrete in or around cold storage assembly.

02 Door(s) must be left open to ventilate interior when concrete is installed in cold storage assembly.

03 Protect exposed surface of panels from damage resulting from other work during installation.

F. Floorless Assemblies:

01 6 mil polyethylene sheets in slab recess with all joints lapped 6 inches and sealed to form a watertight seal.

02 Level, square and anchor prefabricated perimeter screeds and partition wall panels to slab recess.

03 2" thick rigid polyurethane board insulation set in mastic with staggered joints. Refer to detail.

a Two (2) layers for cooler storage assemblies only.

b Three (3) layers for freezers and combination cooler/freezer storage assemblies.

04 15# felt slip sheet over insulation with 6" lapped joints flashed up height of finished floor base.

G. Dial Thermometer:

01 2 1/2" diameter chrome-plated, flush mounted, dual reading, adjustable dial thermometer with recalibration.

02 Thermometers furnished with sufficient length of capillary tubing to extend from exterior front of cold storage assembly to a mounting position of sensor bulb within evaporator return air-stream with tubing clipped to panel at 36" o.c.

H. Temperature Alarm:

01 Modularm Corporation model 75LC flush mount temperature monitor/alarm with dry contacts for connection to remote alarm.

02 Probe Cord:

a Provide length required to extend from exterior front of assembly to mounting position of sensor within evaporator return air-stream.

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- b Run probe cord, out through cold storage assembly roof, then above roof to behind evaporator then back through roof and drop into return air stream.
 - c Pre-wire to common connecting point on cold storage assembly roof.
 - d No exposed conduit on interior ceiling.
 - e Seal penetrations at interior and exterior of cold storage assembly.
- 03 Connection to remote alarm by Division 26.
- I. Light Fixtures:
- 01 Pre-wire switch in door panel and lights to common connecting point on cold storage assembly roof.
 - 02 Installation:
 - a Connect ceiling light fixture through hub fitting located on top of fixture.
 - b Seal hub and conduit interior, airtight at exterior side of walk-in panel.
 - c No exposed conduit on interior ceiling.
 - d Install all horizontal conduit above ceiling panels.
 - e Install plastic sleeve through ceiling panels for electrical conduit. Seal sleeved penetrations airtight at both sides of panel.
- J. Panel Sealant:
- 01 Seal penetrations of panels with Dow Corning 3-6548 silicone RTV foam, full-depth of panel. Trim excess flush.
 - 02 Provide stainless steel escutcheon at sealed area.
- K. Closure Panels:
- 01 Closure material same as wall panels, unless specified otherwise. Refer to detail for materials, panel construction and method of attachment.
 - 02 Install trim strips to building walls and ceiling with concealed attachment.
- L. Compartment Doors:
- 01 36" x 78" nominal clearance unless specified otherwise.
 - 02 Door(s) mounted on three (3) adjustable, spring loaded, lift-off cam hinges.
 - 03 Door(s) swing as indicated on drawings.
 - 04 Reinforce wall panels to rigidly-support door assemblies.
 - 05 Provide replaceable, heater cable at all door opening perimeters. Install 16 gauge stainless steel hat-channel wire chase, full-width of jamb with 1/8" stainless steel removable flush sill, secured with stainless steel screws and sealed watertight to channel.
 - 06 Thermostat control for heater cable at door perimeters.
 - 07 1/8" aluminum diamond tread kickplates 36" high each side of door.
 - 08 14" x 24" three-panel glass view window with heater and molded non-metallic inner and outer frame.
 - 09 Padlock provisions in door latch with interior safety release.
 - 10 Foot treadle door opener.
 - 11 Door(s) material/finish same as panel finish unless specified otherwise.
- M. Compartment Identification Sign:
- 01 12" x 2" engraved phenolic, black plastic compartment identification sign with 1" high white letters.
 - 02 Mount sign centered on compartment door 2" above window.
- N. Custom sized panels must be constructed same as standard panels with like edges, locks and other features.
- 2.10 REFRIGERATED EQUIPMENT SYSTEMS**
- A. Refrigeration systems shall be furnished complete with necessary controls and accessories required for proper operation of a working system.

- B. Refrigerants:
 - 01 Refrigerants and associated components must comply with the requirements of current codes and regulations.
 - 02 Refrigerants must be non-ozone depleting type and comply with the Montreal Protocol Agreement.
- C. Check and adjust self-contained or factory-installed condensing unit to proper operating temperature. Operating temperature to comply with FDA and HACCP guidelines.

2.11 COLD STORAGE REFRIGERATION SYSTEMS

- A. Evaporator Coils:
 - 01 Specified quantity and model, ceiling-hung by ½" o.d. nylon bolts with stainless steel washers and nuts.
 - 02 Insert hanger bolts through plastic sleeve and seal penetration airtight.
- B. Evaporator Drain Lines:
 - 01 Install evaporator drain lines as indicated on drawings.
 - 02 Install cast tee-fittings on drain pan outlet with union and cleanout plug and extend 1" Type K copper drain line through wall panel to air-gap fitting or floor drain.
 - 03 Slope drain line ½" per foot, trap at exterior of assembly and turn down into drain. Set lines 1" clear from adjacent surfaces.
 - 04 Manifold drain lines of adjacent compartments wherever possible. Minimize line runs in rooms below 32°F.
 - 05 Install plastic sleeve through compartment wall, seal around drain line and install stainless steel escutcheon with set screws.
 - 06 Provide Chromalox "Safe-T-Warp" self-regulating electric heater cable on all drain lines from evaporators in room(s) operating below 36°F.
 - a Install cable from evaporator drain line fitting to wall penetration.
 - b Install cable in accordance with manufacture's recommendations to provide adequate heat on drain line.
 - c Inter-wire cable to unit cooler for continuous operation.
 - 07 Cover drain line(s) with ½" wall, Armstrong "Armaflex" pipe insulation.
 - a Fully seal all butt joints or mitered joints with factory approved adhesive.
 - b Install "Armaflex" per manufactures recommendations.
 - 08 Pre-Assembled Evaporator Coil Components:
 - a Sporlan thermostatic expansion valve with external equalizer.
 - b Eco-Smart demand defrost controller with three (3) temperature sensors.
 - c Manual-lift stem solenoid valve.
 - d Electrical disconnect switch in NEMA 4 enclosure.
- C. Rack-Mounted Compressor/Condensing Unit (scroll unless otherwise specified) Assemblies:
 - 01 Air-cooled units, each fitted with the following accessories and electrical components pre-wired to control panel.
 - a Suction and discharge line vibration eliminators on semi-hermetic/discus compressors.
 - b Shut-off valve at condensing unit inlet and outlet.
 - c Sporlan "Catch-all" refrigerant filter/dehydrator at condensing unit outlet with "See-all" sight glass and cover.
 - 02 Condensing Units Requiring Oil Separator:
 - a Condensing units suppling multi-fixtures.
 - b Located 45' higher than evaporator coil.
 - c Located more than 100' from evaporator coil.
 - d Pipe oil to suction line return of condensing unit with shut-off valve mounted in line.

- 03 Exterior Mounted Condensing Units:
 - a Compressor/condensing units installed in an area subject to weather conditions or low ambient temperatures furnished with winter controls and type 304 stainless steel enclosure.
 - b Enclosure to include removable louver front outlet for servicing, protective inlet screen and interior baffles to condenser to prevent air flow bypass.

D. Refrigerant System Installation:

- 01 Refrigerant Lines:
 - a Type "L" or ARC hard copper tubing.
 - b Wrought copper or brass fittings designed for use with high temperature solder.
 - c Piping joints made with silver solder (Sil-Fos).
 - d Piping properly suspended from and anchored to structure with adjustable hangers 6" o.c. maximum.
 - e Suction lines sized to have maximum pressure drop of two pounds in medium temperature systems.
 - f Suction lines sized to have maximum pressure drop of one pound in low temperature systems.
 - g Liquid lines sized to give maximum pressure to prevent trapping of oil.
- 02 Suction Lines:
 - a Cover all medium temperature suction lines with 3/4" thick wall, Armstrong "Armaflex" pipe insulation.
 - b Cover all low temperature suction lines with 1" thick wall, Armstrong "Armaflex" pipe insulation.
 - c Fully seal all butt joints or mitered joints with factory approved adhesive.
 - d Install "Armaflex" per manufacturer's recommendations.
- 03 Refrigerant lines in PVC or EMT conduit:
 - a Sealed at both ends with Dow Corning 3-6548 silicone RTV foam.

E. Evacuation and Charging:

- 01 Evacuation:
 - a After completion of pressure test, system shall be evacuated using an approved auxiliary vacuum pump.
 - b Connections for evacuation to be in accordance with manufacturer's recommendations.
- 02 Charging:
 - a Charging subsequent to initial charge which is contained in condensing unit is to be given through charging valve in high side passing all liquid refrigerant through a charging dehydrator.
 - b All charging lines and gauges to be purged of air prior to connection with system.
 - c Refrigerant to be new (no prior use) and shall be delivered in clean containers.
 - d After system is fully charged, start and place in full operation.

F. Start-Up Temperature Reduction:

- 01 When starting refrigeration system(s), reset refrigerated room thermostats daily for maximum temperature drop of 15°F. per day, down to 36°F. and maximum of 10°F. per day between 36°F. and operating temperature.

2. 12 REGULARLY MANUFACTURED EQUIPMENT

- A. Regularly manufactured equipment and components must be built to NSF standards and bear NSF label.
- B. Provide standard finishes and accessories unless otherwise specified per Contract Documents.
- C. Provide manufacturer's most current model, version and style of specified equipment. When primary model has been discontinued provide manufacturer's subsequent model with size, function, finish, features, accessories and approvals as specified equipment.

- D. Equipment of like categories shall be the same brand and manufacturer unless otherwise specified in the Contract Documents.

2.13 FABRICATED AND FIELD-ASSEMBLED EQUIPMENT

- A. Provide equipment in arrangement and configuration as shown on Plans, Elevations and Detail Drawings.
- B. Field welding and assembly of fabricated equipment to be performed by manufacturer of equipment.

- 2.14** Refer to **PART 2 - PRODUCTS** for components, fittings, accessories, and requirements related to manufactured and fabricated equipment listed.

2.15 FOODSERVICE EQUIPMENT SCHEDULE

EMPLOYEE DINING ROOM

ITEM NO. 01ED WALK-IN COOLER & FREEZER

- A One (1) - Mid-South Industries, Thermo-Kool, 14'- 10" long x 9'- 2" wide x 9'- 4" high. Provide per details, drawings and PART 2-PRODUCTS Articles 2.09 and 2.11.
- B To include:
 - 01 Without floor.
 - 02 13-1/2" high foam screed.
 - 03 Finished floor by General Contractor.
 - 04 N.S.F. construction.
 - 05 U.L. classified.
 - 06 Class I foam.
 - 07 36" x 78" door.
 - 08 Hinge doors per drawings.
 - 09 Chrome plated hardware.
 - 10 Door with automatic closer, self-closing hinges, foot treadle, magnetic latch, magnetic gasket, cylinder lock and kickplates each side. Provide each door with three spring loaded hinges.
 - 11 Component Hardware model VXS-LEDPK10N-PC series, LED, vapor-proof, 10W, light fixture with lamp and protective globe. Ceiling mounted in each compartment per drawings. Pre-wire to common connecting point, on walk-in roof. No exposed conduit on interior ceiling.
 - 12 Heated threshold.
 - 13 Apply 1/8" thick x 36" high, No. 6061-T6 hard-alloy aluminum diamond tread plate to all exposed exterior walls and walk-thru door (interior and exterior). Seal all joints with gray colored Dow-Corning 795 silicone sealant.
 - 14 Closure panels at exposed sides per detail.
 - 15 Angled wall trim at walls per detail.
 - 16 Provide each compartment with Modularm, Corporation model 75LC , flush mount temperature alarm and walk-in light manager with dry contacts for connection to remote alarm (connection to remote alarm by Division 26) and probe-cord length required to extend from exterior front of assembly to a mounting position of the sensor within evaporator return air-stream. Pre-wire to common connecting point, (light connection), on walk-in roof. No exposed conduit on interior ceiling. Set light timer to leave lights on for 30 minutes.
 - 17 Heated pressure relief port in cooler. Pre-wire to common connecting point, (light connection), on walk-in roof. No exposed conduit on interior ceiling.
 - 18 Heated pressure relief port in freezer. Pre-wire to common connecting point, (light connection), on walk-in roof. No exposed conduit on interior ceiling.
 - 19 Provide Kingman Industries, "Thermo-Curtain", model 6-2-04 curtain at each door opening. Vulene vinyl, breakaway loop, strips with rounded edges and 50% overlap. Include all mounting hardware.

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- 20 Provide New Age Industrial Corp., Inc., 5" high aluminum baseboard, at interior of each compartment. Miter inside and outside corners. Smooth edges of outside corners. Install baseboard after interior finish floor is installed. Set base bottom and top edges in bead of silicone sealant.
- 21 Construct all special size panels using same methods, materials and locking system as used to construct standard panels. Special size panels must connect to and be locked with other panels, using joint design and locks identical to standard panels. Connecting of panels by any other method is not acceptable.

C Ancillary Equipment:

- 01 Refrigeration Design Technologies Inc., refrigeration systems as follows:
 - a MOZ-series , 208V-3ph, pre-assembled remote, with fused disconnect and using R407A refrigerant in refrigeration system. Provide Eco-Smart demand defrost controllers with expansion valve, solenoid valve pre-wired and mounted on evaporators. Job site installation to consist of piping condensing unit to evaporator, evacuating and charging units with refrigerant.
 - b Cooler, +35°F.: Model MOZ005M63C, (0.8 HP), 208V-3ph, medium temp, air-cooled compressor. model ADT-052, 120V-1ph, evaporator. Cooler defrost to be "Ecosmart" type with positive refrigeration cycle shutdown.
 - c Freezer, -10°F: Model MOZ025L63C, (2.5 HP), 208V-3ph, low temp, air-cooled compressor. Model LET-065, 208V-1ph, evaporator with electric defrost initiated by "Ecosmart" demand defrost controller.
 - f Refrigeration systems with winter controls and stainless steel, exterior weather-proof housings.

D Special Instructions:

- 01 Installation must be supervised by factory personnel or factory authorized personnel.
- 02 Install walk-in walls into building floor recess per drawings.
- 03 Level and square exterior wall and partition floor screeds. Anchor screeds to slab recess.
- 04 Prior to assembly of insulated panels, apply 1/4" to 3/8" bead of Dow-Corning 795 silicone sealant (color gray or white to match panel finish), at exterior side of panel tongue and groove edge.
- 05 Protect exposed surface of panels from installation of concrete floor and other work. Provide protective covering on walls during installation of concrete in or around walk-in. Door(s) must be left open to ventilate interior when concrete is installed in walk-in interior.
- 06 Install condensing units on building roof per details, drawings and manufactures recommendations.
- 07 Install evaporator coils as indicated on drawings per manufactures recommendations.

ITEM NO. 02ED WALK-IN SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts. Section below evaporator provide three (3) shelves and four (4) 63" posts.
- B Each section to include:
 - 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adust shelves.
 - 03 Four (4) posts.
- C Sections:
 - 01 Two (2) 14" x 36"
 - 02 Two (2) 21" x 36"
 - 03 Four (4) 21" x 48"
 - 04 One (1) 21" x 54".
- D Special instructions:
 - 01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.
 - 02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.

03 Section below evaporator include two (2) Quad-Truss and one (1) Quad-Adjust shelves.

ITEM NO. 03ED STORAGE SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts.
- B Each section to include:
 - 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adust shelves.
 - 03 Four (4) posts.
- C Sections:
 - 01 One (1) 21" x 48"
 - 02 One (1) 21" x 60".
- D Special instructions:
 - 01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.
 - 02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.

ITEM NO. 04ED VEGETABLE PREPARATION TABLE

- A One (1) - Fabricated, configuration per details and drawings.
- B To include:
 - 01 Work surface 36" AFF.
 - 02 Stainless steel construction.
 - 03 Marine edge top.
 - 04 Two (2) 20" x 18" x 3/4" deep recessed top with 18" x 18" x 11- 1/4" deep sink compartment per detail.
 - 05 Can opener in top of table, per detail.
 - 06 Open structure base.
 - 07 Undershelf where unobstructed.
 - 08 Parking space in base for trash can.
 - 09 Corner legs with flanged feet.
 - 10 Flanged foot where required by the contract documents.
 - 11 14 ga. stainless steel bracket below top with cutting board holder. Construct per detail.
 - 12 14 ga. stainless steel bracket below top for mounting knife rack. Construct per detail.
 - 13 Elevated shelf per details and drawings. Table mounted 21" above top.
 - 14 Two (2) 16 ga. stainless steel printer stands mounted at each end of elevated shelf.
- C Ancillary Equipment:
 - 01 Component Hardware, model KL51-9012-SE1, deck mount, faucet with 12" swing spout.
 - 02 Nemco, model 56050-1, can opener.
 - 03 Two (2) Richlite 3/4" thick, reversible, NSF approved, cutting board with finger hole.
 - 04 Edlund, model KR-699, knife rack.
 - 05 Two (2) Component Hardware, model DSS-8015, lever drain assembly.
- D Special instructions:
 - 01 Install faucet and mounting kit.
 - 02 Install can opener.
 - 03 Install knife rack on bracket.
 - 04 Cutting boards to fit into recessed top of sink compartment.
 - 05 Verify size of printer with Owner and coordinate with stands.
 - 06 Anchor table to floor.

ITEM NO. 05ED **NUMBER NOT USED**

ITEM NO. 06ED **MOBILE REFRIGERATED MAKE TABLE**

- A One (1) - Continental Refrigerator, model DL48-12-FB.

- B To Include:
 - 01 Stainless steel top, sides and doors.
 - 02 Stainless steel interior.
 - 03 Front breathing refrigeration.
 - 04 Stainless steel insulated cover.
 - 05 Full length 12" wide cutting board.
 - 06 Stainless steel divider bars for 1/6th size pans.
 - 07 Hinge doors per drawings.
 - 08 Cord and plug.
 - 09 3 5/8" dia. swivel casters with polyurethane tires.

- C Ancillary Equipment:
 - 01 Twelve (12) Vollrath, model 90642, 4" deep, 1/6th size stainless steel pans.

ITEM NO. 07ED **FREEZER**

- A One (1) - Continental Refrigerator, model DL1F-SS-HD.

- B To Include:
 - 01 Half height doors.
 - 02 Hinge doors per drawings.
 - 03 One (1) extra shelf per section.
 - 04 Cord and plug.

- C Ancillary Equipment:
 - 01 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor.

- D Special Instructions:
 - 01 Anchor toe base to freezer.

ITEM NO. 08ED **VENTILATOR W/ FIRE SUPPRESSION SYSTEM**

- A One (1) - CaptiveAire Systems, model 6030ND-2-PSP-F, exhaust-only wall canopy with ceiling mounted perforated supply air plenum. Unit 5'-0" wide x length per drawings.

- B To include:
 - 01 18 ga., type 304, stainless steel construction.
 - 02 Constructed in accordance with NFPA 96.
 - 03 ETL listed and bear label.
 - 04 ETL Sanitation listed and bear label.
 - 05 Fully weld exhaust air plenum.
 - 06 Recessed, vapor-proof, LED, 30W, light fixtures with bulbs. Provide remote touch-screen control panel for lights and fans. Inter-connect lights between junction boxes on multi-section ventilators. Provide single point electrical connection for final hook-up. Conceal all conduit. Ventilator provided with three (3) lineal feet of light fixture per each 4'-0" of length.
 - 07 Captrate Solo stainless steel filters. ETL Listed.
 - 08 Insulate supply air plenum.

- 09 Air dampers at interior of supply air plenum.
- 10 Supply air grilles sized to provide air velocity as recommended by manufacture.
- 11 CaptiveAire Smart Controls, Thermostatic Control, to automatically activate the ventilator fans when cooking occurs. Inter-wire system to sensor(s). System installed in stainless steel utility cabinet, mounted on end of ventilator. Pre-wired system to single point connection for final connection to power and connection to fan contact by Division 26. Contact by Division 26.
- 12 Pipe chase at ventilator ends for gas supply lines. Chase bottom closed with cut-out for gas pipe.
- 13 Stainless steel angle trim at ceiling as required. One piece corners.
- 14 Stainless steel closure panels to ceiling as required. One piece corners.
- 15 Fire suppression system Ansul , "PIRANHA", chemical, automatic system, in accordance with codes, ordinances, manufactures recommendations and per PART 2 -PRODUCTS, Exhaust Hood Fire Suppression Systems. Provide required surface protection, fuel shut-off devise(s) and micro switches.

C Ancillary Equipment:

- 01 Stainless steel wall panels at ventilator(s) where adjacent to walls:
 - a Construct panels of 18 ga. 304, stainless steel. Apply fire rated contact cement to wall and stainless steel panel. Install on walls as shown on drawings. Extend panels from top of base to 1" behind ventilator and 18" beyond each end of ventilator. Stainless steel panels extended to finished ceiling where not under ventilator.
 - b Construct panel section in equal widths. Minimum panel width 24", except at ends. End panels must be equal width but not less than 12". At corner turns form panel with 1/4" radius and return to adjacent wall. Corner returns shall be a minimum of 6" wide.
 - c Minimize vertical joints. No horizontal joints.
- 02 Component Hardware Group, Inc. model J60-2260, 1" wide, flat stainless steel snap-on molding over all vertical joints and at edges where panels terminate.

D Special instructions:

- 01 Installation must be supervised by factory personnel or factory authorized personnel.
- 02 Provide test of ventilator air system volumes (exhaust and supply air) to determine compliance with the design requirements. Contractor must comply with provisions of state and local codes and ordinances, during testing. Submit data to Architect.
- 03 Hang with 1/2" dia. steel hanger rods and turn buckles. Provide required structural members to suspend ventilator from overhead structure.
- 04 Set ventilator lower front edge 6'-8" AFF.

ITEM NO. 09ED COMBI OVEN

- A One (1) - Rational CombiMaster Plus, model 202 NG, natural gas.

B To Include:

- 01 Stainless steel front, sides and top.
- 02 Mode selector control.
- 03 100 cooking programs
- 04 Five speed programmable fan.
- 05 Core temperature probe.
- 06 Hand shower with automatic retracting system.
- 07 Fourteen (14) CombiGrill.
- 08 Ten (10) Grill & Pizza Tray.
- 09 Ten (10) CombiFry Basket.
- 10 Five (5) CombiRib-Grid.
- 11 Eleven (11) Multibaker.
- 12 Ten (10) Super Spike Chicken Grid.
- 13 Twelve (12) Grill Cleaner.
- 14 Two(2) Hand Spray Bottle.
- 15 Built-in gas pressure regulator.

- 16 Cord and plug.
- 17 Installation Kit.

C Ancillary Equipment:

- 01 Everpure "Kleensteam", model EV9797-22 Kleensteam II Twin System, water filter.
- 02 Water pressure reducing valve.
- 03 Water hammer arrestor.

D Special Instructions:

- 01 Mount water filter on wall behind equipment.
- 02 Provide start-up inspection service by factory authorized service agent.
- 03 Provide factory authorized personnel for operation and maintenance training.
- 04 Provide one (1) day training session for Owner's personnel with factory Chef.

ITEM NO. 10ED NUMBER NOT USED

ITEM NO. 11ED MOBILE FRYER BANK

- A One (1) battery - Pitco, model SG14RS-FD, natural gas, per drawings.

B To Include:

- 01 Stainless steel fat container.
- 02 Stainless steel front, door and sides.
- 03 Electronic ignition with drain valve interlock.
- 04 Digital controls with melt cycle.
- 05 Multi-cabinet unit.
- 06 Model BNB dump station with stainless steel pan and screen.
- 07 Stainless steel lift-off covers for fryers and dump station.
- 08 Solstice Filter Drawer System installed in BNB cabinet.
- 09 Heated filtration system.
- 10 Oil reclamation system for liquid shorting.
- 11 Single point rear gas connection.
- 12 "T" gas manifold.
- 13 Gas pressure regulator valve.
- 14 9" adjustable casters with front locking brakes.
- 15 One (1) case filter paper part # A7025301.
- 16 One (1) case filter powder part # PP10733.

C Ancillary Equipment:

- 01 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model HG-4F-48SK, 1 1/4" I.D., plastic coated 48" long, flexible gas hoses and quick disconnect assembly.
- 02 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model K kit, including restraining device.

D Special Instructions:

- 01 Locate BNB cabinet per drawings.
- 02 Anchor restraining device to fryer and wall.
- 03 Furnish hose and quick disconnect assembly to Division 22 for installation.

ITEM NO. 12ED SALAMANDER BROILER

- A One (1) - Montague, model SB36-W, infrared salamander broiler, wall mounted, natural gas.

B To Include:

- 01 Stainless steel front, sides, bottom and top.
- 02 Rear gas connection.

03 Gas pressure regulator valve.

C Ancillary Equipment:

01 Provide 14 ga., type 304 stainless steel, 2" x 2" square tubing, fully welded, wall mounted supports. Fully weld ends of supports closed. Cross brace supports with 2" x 2" square tubing. Set salamander broiler on extended horizontal supports 6" forward from wall. Secure broiler to supports. Reinforce wall to support salamander broiler.

D Special Instructions:

01 Install salamander broiler on wall behind equipment. Include all accessories required to make installation.
02 Set bottom of salamander broiler 55" AFF.
03 Submit shop drawing of supports.
04 Install salamander broiler above Item No. 14ED, Mobile Griddle.

ITEM NO. 13ED MOBILE REFRIGERATED EQUIPMENT STAND

A One (1) - Continental Refrigerator, model DL-60G. Modified.

B To Include:

01 16 GA., type 304 stainless steel top with drip guard marine edge.
02 Modify top to 68" of overall length. Center top over base.
03 Heat shield Insulated top.
04 Cord and plug.
05 3" dia. swivel casters with polyurethane tires. Front casters with brakes.

C Ancillary Equipment:

01 Six (6) Vollrath model 90062, 6" deep, full size stainless steel pans.
02 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model K kit, including restraining device.

D Special Instructions:

01 Install Item No. 14ED, Mobile Griddle on equipment stand.
02 Install Item No. 15ED, Mobile Char-Broiler on equipment stand.
03 Anchor restraining device to equipment stand and wall.
04 Submit shop drawing of refrigerated equipment stand.

ITEM NO. 14ED MOBILE GRIDDLE

A One (1) - MagiKitch'n, model MKG-36-E, natural gas.

B To Include:

01 Thermostat controls.
02 Electric ignition.
03 Cord and plug.
04 Gas pressure regulator valve.

C Ancillary Equipment:

01 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model HG-4D-48SK, 3/4" I.D., plastic coated 48" long, flexible gas hoses and quick disconnect assembly.
02 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model K kit, including restraining device.

D Special Instructions:

01 Install griddle without legs.
02 Anchor griddle to stand.
03 Anchor restraining device to griddle and wall.
04 Furnish hose and quick disconnect assembly to Division 22 for installation.

ITEM NO. 15ED MOBILE CHAR-BROILER

- A One (1) - MagiKitch'n, model CM-RMB-630, natural gas.
- B To Include:
 - 01 Stainless steel front, sides and back.
 - 02 Side and back extensions.
 - 03 Scround rod top grate with standard spacing.
 - 04 Water Tubs
 - 05 Safety pilot.
 - 06 Rear gas connection.
 - 07 Gas pressure regulator valve.
- C Ancillary Equipment:
 - 01 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model HG-4D-48SK,3/4" I.D., plastic coated 48" long, flexible gas hoses and quick disconnect assembly.
 - 02 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model K kit, including restraining device.
- D Special Instructions:
 - 01 Anchor restraining device to char-broiler and wall.
 - 02 Furnish hose and quick disconnect assembly to Division 22 for installation.

ITEM NO. 16ED MOBILE RANGE

- A One (1) - Montague, model M12-5, modular two burner range, natural gas.
- B To Include:
 - 01 Stainless steel front, sides and top.
 - 02 Model M12S stainless steel 12" wide spreader.
 - 03 Model HB24 stainless steel 18" high flue riser.
 - 04 Stainless steel tubular base with 16 ga. stainless steel undershelf fully welded to legs.
 - 05 Rear gas connection.
 - 06 Gas pressure regulator valve.
 - 07 5" dia. swivel casters with stainless steel yokes and polyurethane tires. Refer to "Casters" in this Section.
- C Ancillary Equipment:
 - 01 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model HG-4C-48SK, 1/2" I.D., plastic coated 48" long, flexible gas hoses and quick disconnect assembly.
 - 02 T & S Brass and Bronze Works, Inc., "Safe-T-Link" model K kit, including restraining device.
- D Special Instructions:
 - 01 Submit shop drawing of range.
 - 02 Anchor restraining device to range and wall.
 - 03 Furnish hose and quick disconnect assembly to Division 22 for installation.

ITEM NO. 17ED MOBILE HOT FOOD CABINET

- A One (1) - Cres-Cor, model H-137-SUA-12D.
- B To Include:
 - 01 Hinge door per drawing.
 - 02 Perimeter bumper.
 - 03 Polyurethane tired casters.

ITEM NO. 18ED MOBILE POS STAND

- A One (1) - Fabricated, configuration per drawings and details.
- B To Include:
 - 01 Work surface 34" AFF.
 - 02 Stainless steel construction.
 - 03 Closed body base.
 - 04 Stainless steel hinged doors per details. Each door with door locks, keyed alike.
 - 05 Bottom and intermediate shelf enclosed with hinged doors.
 - 06 5" dia. swivel casters with stainless steel yokes and polyurethane tires. Refer to "Casters" in this Section.

ITEM NO. 19ED WALL MOUNTED P.O.S.

- A Two (2) - By Owner.

ITEM NO. 20ED NUMBER NOT USED

ITEM NO. 21ED MOBILE SERVING COUNTER

- A One (1) - Delfield, ShellySteel, mobile serving counter, configuration per drawings.
- B Consisting of the following components:
 - 01 Model SH-4-NU Four Well Hot Food Counter.
 - a Counter top 34" AFF.
 - b 14 ga., 304 type, stainless steel top.
 - c 18 ga. stainless steel base.
 - d Apron panel below top on server's side.
 - e Model G-60 stainless steel, single sided, adjustable food shield with shelf. Provide fluorescent light fixture, under food shield, wired to base.
 - f Model E-60 stainless steel, 12" wide, folding, solid tray slide. Mounted 34" AFF.
 - g Locking devise on ends for joining counters.
 - h Manifold hot food well drain lines to single connection point and extend to drain valve.
 - i Mount drain valve on, server side, left end of counter.
 - j Extend drain line an terminate above floor drain.
 - k Pre-wire light fixture to switch in apron panel on server side.
 - l Pre-wire hot food well to controls in apron panel on server side.
 - m Pre-wire 120/208V-1ph receptacle on interior of base to connect Soup Counter cord and plug.
 - n Provide single electrical cord and plug for Hot Food Counter. Pre-wire all components to common connection point.
 - o Cord and plug from Hot Food Counter to provide electrical service for entire Serving Counter.
 - p Connect 9'-0" cord and plug to receptacle in wall.
 - q 5" dia. swivel casters with polyurethane tires. Casters with brakes.
 - r Plastic laminate panels front and sides. Plastic laminate selected, by Architect, from manufactures standard, matte finished, colors.
 - 02 Model SC-50-NU Two Well Soup Counter.
 - a Counter top 34" AFF.
 - b 8" top reduction modification.
 - c 14 ga., 304 type, stainless steel top.
 - d 18 ga. stainless steel base.
 - e Apron panel below top on server's side.
 - f Model E-50 stainless steel, 12" wide, folding, solid tray slide. Mounted 34" AFF.
 - g Locking devise on ends for joining counters.
 - h Extend drain line an terminate above floor drain.
 - i Pre-wire soup wells to controls in apron panel on server side.

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- j Pre-wire 120/208V-1ph receptacle on interior of base to connect Cold Food Counter cord and plug.
 - k Provide single electrical cord and plug for Soup Food Counter. Pre-wire all components to common connection point. Connect cord and plug to receptacle in Hot Food Counter.
 - l 5" dia. swivel casters with polyurethane tires. Casters with brakes.
 - m Plastic laminate panels front and sides. Plastic laminate selected, by Architect, from manufactures standard, matte finished, colors.
- 03 Model SCS-36-B Refrigerated Cold Food Counter.
- a Counter top 34" AFF.
 - b 24" top extension modification.
 - c 14 ga., 304 type, stainless steel top.
 - d 18 ga. stainless steel base.
 - e NFS-7 refrigerated cold pan.
 - f Apron panel below top on server's side.
 - g Model G-60 stainless steel, single sided, adjustable food shield with shelf. Provide fluorescent light fixture, under food shield, wired to base.
 - h Model E-60 stainless steel, 12" wide, folding, solid tray slide. Mounted 34" AFF.
 - i Locking devise on ends for joining counters.
 - j Extend drain line an terminate above floor drain.
 - k Pre-wire light fixture to switch in apron panel on server side.
 - l Pre-wire cold pan to switch in apron panel on server side.
 - m Provide single electrical cord and plug for Refrigerated Cold Food Counter. Pre-wire all components to common connection point. Connect cord and plug to receptacle in Soup Counter.
 - n 5" dia. swivel casters with polyurethane tires. Casters with brakes.
 - o Plastic laminate panels front and sides. Plastic laminate selected, by Architect, from manufactures standard, matte finished, colors.
- C Special instructions:
- 01 Join Item 01, Hot Food Counter with Item 02, Soup Counter.
 - 02 Join Item 02, Soup Counter with Item 03, Refrigerated Cold Food Counter.
 - 03 Submit shop drawing of Serving Counter detailing equipment line-up and electrical connections.

ITEM NO. 22ED MOBILE SERVING COUNTER

- A One (1) - Fabricated, configuration per drawings and details.
- B To Include:
- 01 Work surface 34" AFF.
 - 02 Stainless steel construction.
 - 03 Closed body base.
 - 04 Stainless steel hinged doors per details. Each door with door locks, keyed alike.
 - 05 Bottom and intermediate shelf enclosed with hinged doors.
 - 06 5" dia. swivel casters with stainless steel yokes and polyurethane tires. Refer to "Casters" in this Section.

ITEM NO. 23ED SERVING COUNTER

- A One (1) - Fabricated, configuration per drawings and details.
- B To Include:
- 01 Work surface 34" AFF.
 - 02 Stainless steel top.
 - 03 Splash where adjacent to walls and equipment.
 - 04 Cut and polish hole(s) in top for extending beverage lines, cord and plug to services below top. Coordinate size/location with Ice & Carbonated Beverage Dispenser.
 - 05 Cut and polish hole(s) in top for Base Outlet.

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- 06 Closed body base with plastic laminate covered front, per details. Plastic laminate selected, by Architect, from manufacture's standard colors.
- 07 Cutout for Item No. 28ED, Undercounter Refrigerator. Provide 18 ga. stainless steel lining at front and sides of cutout.
- 08 Carbonator storage compartment. 14 ga. stainless steel pan with drain, per details. Removable pan recessed into toe base, per drawings and details. Storage compartment enclosed with hinged door.
- 09 Bottom shelf enclosed with hinged doors.
- 10 Plastic laminate door per details. Each door with lock, keyed alike.
- 11 Utility compartment located per drawings.
- 12 Plastic laminate removable access panel, per details.
- 13 Pre-pipe brass gate valve, below top, to each base outlet.
- 14 Pre-pipe Base Outlets to a common connection point in utility compartment.
- 15 Extend drain lines to utility compartment and terminate at opening above floor drain.
- 16 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Item No. 28ED Undercounter Refrigerator.
- 17 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Carbonator.
- 18 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Ice & Carbonated Beverage Dispenser.
- 19 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor. Notch base at floor drain and seal base to floor. Floor drain must be accessible when panel is removed.
- 20 Pre-wire and pre-pipe counter with U.L. components per Article 2.6 Fabricated Equipment and Fixtures this Section.

C Ancillary Equipment:

- 01 Two (2) Component Hardware, model K50-X125 base with KL50-X122 adapter, deck mount, base outlet.

D Special instructions:

- 01 Install base outlet behind coffee maker and iced tea brewer.
- 02 Park Item No. 28ED Undercounter Refrigerator in base.
- 03 Brace top to support counter mounted equipment.
- 04 Coordinate base with location of beverage lines.

ITEM NO. 24ED LID & CONDIMENT TRAY

- A One (1) - Dispense-Rite, model WLO-1B.

B To Include:

- 01 Counter mount.
- 02 Removable dividers.

C Special Instructions:

- 01 Install on Item No. 23ED, Serving Counter.

ITEM NO. 25ED MILK DISPENSER

- A One (1) - By Owner.

ITEM NO. 26ED CONDIMENT DISPENSER

- A One (1) - By Owner.

ITEM NO. 27ED COFFEE MAKER

- A One (1) - By Owner.

ITEM NO. 28ED UNDERCOUNTER REFRIGERATOR

- A One (1) - Continental Refrigerator, model DL36-SS-U.
- B To Include:
 - 01 Stainless steel top, front and sides.
 - 02 Stainless steel interior.
 - 03 Front breathing refrigeration.
 - 04 Hinge doors per drawings.
 - 05 Cord and plug.
 - 06 1 3/8" dia. swivel casters.
- C Special Instructions:
 - 01 Install into base of Item No. 23ED, Serving Counter.

ITEM NO. 29ED ICED TEA BREWER

- A One (1) - By Owner.

ITEM NO. 30ED MOBILE DRAWER WARMER

- A One (1) - Hatco, model HDW-2.
- B To Include:
 - 01 Stainless steel finish.
 - 02 Cord and plug.
 - 03 5" dia. locking casters.
- C Special Instructions:
 - 01 Install into base of Item No. 36ED, Mobile Work Table.

ITEM NO. 31ED CARBONATOR

- A One (1) - By Owner.

ITEM NO. 32ED ICE & CARBONATED BEVERAGE DISPENSER

- A One (1) - By Owner.

ITEM NO. 33ED CUP DISPENSER

- A One (1) - Dispense-Rite, model CTC-R-4SS.
- B To Include:
 - 01 Stainless steel finish.
 - 02 Counter mount.
- C Special Instructions:
 - 01 Verify Owner's cup size(s).
 - 02 Adjust cup dispensers to accommodate Owner's cups.
 - 03 Install on Item No. 23ED, Serving Counter.

ITEM NO. 34ED MICROWAVE OVEN

- A One (1) - By Owner.

ITEM NO. 35ED RESIDENTIAL REFRIGERATOR

A One (1) - By Owner.

ITEM NO. 36ED MOBILE WORK TABLE

A One (1) - Fabricated, configuration per details and drawings.

B To include:

- 01 Work surface 36" AFF.
- 02 Stainless steel construction.
- 03 Open structure base.
- 04 5" dia. swivel casters with stainless steel yokes and polyurethane tires. Refer to "Casters" in this Section.

C Special Instructions:

- 01 Park in base of Item No. 30ED, Mobile Drawer Warmer.

ITEM NO. 37ED MOBILE REFRIGERATED MAKE TABLE

A One (1) - Continental Refrigerator, model DL48-12-FB.

B To Include:

- 01 Stainless steel top, sides and doors.
- 02 Stainless steel interior.
- 03 Front breathing refrigeration.
- 04 Stainless steel insulated cover.
- 05 Full length 12" wide cutting board.
- 06 Stainless steel divider bars for 1/6th size pans.
- 07 Hinge doors per drawings.
- 08 Cord and plug.
- 09 3 5/8" dia. swivel casters with polyurethane tires.

C Ancillary Equipment:

- 01 Twelve (12) Vollrath, model 90642, 4" deep, 1/6th size stainless steel pans.

ITEM NO. 38ED PASS-THRU REFRIGERATOR

A One (1) - Continental Refrigerator, model DL1RE-SS-PT-HD.

B To Include:

- 01 Half height doors.
- 02 Hinge doors per drawings.
- 03 One (1) extra shelf.
- 04 Expansion valve system.
- 05 Cord and plug.

C Ancillary Equipment:

- 01 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor.

D Special Instructions:

- 01 Trim wall opening, both sides, per detail.
- 02 Anchor toe base to refrigerator.

ITEM NO. 39ED STORAGE SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts.
- B Each section to include:
 - 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adjust shelves.
 - 03 Four (4) posts.
- C Sections:
 - 01 One (1) 14" x 60"
 - 02 One (1) 21" x 48".
- D Special instructions:
 - 01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.
 - 02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.

ITEM NO. 40ED MOVABLE HOT WELL

- A One (1) - Wells, model TMPT.
- B To Include:
 - 01 4" adjustable legs.
 - 02 Cord and plug.
- C Special Instructions:
 - 01 Restrain excess cord length.
 - 02 Install on Item No. 36ED, Mobile Work Table.

ITEM NO. 41ED PASS-SHELF

- A One (1) - Fabricated, configuration per details and drawings.
- B To include:
 - 01 Stainless steel pass-thru shelf with "V" edge on pick-up side, per detail. Turn all edges straight down and fully weld corners.
 - 02 Provide stainless steel formed pan underbracing at shelf. Provide stainless steel shelf supports under bottom of shelf to stabilize shelf at wall per detail.
 - 03 Stainless steel pass-thru intermediate shelf, per detail. Turn all edges straight down and fully weld corners.
 - 04 Frame window opening with stainless steel, fully welded, trim on both sides per detail.
- C Special Instructions:
 - 01 Install Item No. 42ED, Heat Lamp into window per details.

ITEM NO. 42ED HEAT LAMP

- A One (1) - Hatco, model GRH-48.
- B To Include:
 - 01 Toggle switch.
 - 02 Adjustable angle brackets.

- C Special Instructions:
 - 01 Install heat lamp in window opening above bottom shelf of Item No. 41ED Pick-Up Shelf, per details.

ITEM NO. 43ED PICK-UP COUNTER

- A One (1) - Fabricated, configuration per details and drawings.
- B To Include:
 - 01 Work surface 36" AFF.
 - 02 Stainless steel construction.
 - 03 Splash where adjacent to walls.
 - 04 Closed body base.
 - 05 Intermediate and bottom shelves open per details and drawings.
 - 06 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor.

ITEM NO. 44ED NUMBER NOT USED

ITEM NO. 45ED ICE MAKER W/ TRANSPORT CART

- A One (1) - Hoshizaki, model KM-1100MAH, air cooled .
- B To Include:
 - 01 Crescent Cube ice.
- C Ancillary Equipment:
 - 01 Water hammer arrestor.
 - 02 Water pressure reducing valve.
 - 03 Everpure model EV9325-04 "Insurice" QUAD-I4000 water filter system.
 - 04 San Jamar, model SI9000, Saf-T-Scoop Guardian System.
 - 05 Follett Corp. model DEV1010SG-48-75, bin with stainless steel exterior and base. Provide SmartCART 75 with three (3) totes, ice paddle, ice rake and hanging bracket.
- D Special Instructions:
 - 01 Install ice maker on bin. Include all accessories required for complete installation.
 - 02 Locate front of ice maker flush with front of ice bin.
 - 03 Mount water filter on wall with 16 ga. stainless steel mounting plate. Size and shape to accommodate filter bracket. Attach mounting plate to wall with stainless steel pan head screws. Weld stainless steel keyhole studs to mounting plate and attach filter bracket.
 - 04 Mount scoop hanging bracket on side of bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate hanging bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach hanging bracket.

ITEM NO. 46ED SOILED DISHTABLE

- A One (1) - Fabricated, configuration per drawings and details.
- B To include:
 - 01 Work surface 34" AFF.
 - 02 Stainless steel construction.
 - 03 Splash where adjacent to walls.
 - 04 Scupper drain per details.
 - 05 Pre-rinse sink per details.
 - 06 Extend table top thru pass-window per detail.

- 07 Open structure base.
- 08 Undershef where unobstructed.
- 09 Flanged foot where required by the contract documents.

C Ancillary Equipment:

- 01 Component Hardware, model KL53-1000-BR, splash mount, pre-rinse assembly with wall bracket.
- 02 Component Hardware, model KL40-1000, mounting kit.
- 03 Component Hardware, model E32-4900, flat strainer drain.

D Special instructions:

- 01 Install pre-rinse assembly and mounting kit above pre-rinse sink per drawings.
- 02 Anchor dishtable to floor.

ITEM NO. 47ED DISHWASHER W/ BOOSTER HEATER

- A One (1) - Champion, model DH-5000T, high temperature machine.

B To Include:

- 01 Direction of operation per drawing.
- 02 Extended wash tank chamber.
- 03 Stainless steel frame, legs and feet.
- 04 Stainless steel front and side panels.
- 05 Single point electrical connection for dishwasher and booster heater.
- 06 Regulated electric heat (5.2 KW).
- 07 Built-in booster heater for 70°F. water temperature rise.
- 08 Automatic tank fill.
- 09 Common drain connection.
- 10 Water pressure reducing valve.
- 11 Water hammer arrestor.
- 12 Factory installed drain water tempering kit.
- 13 Vent fan control for interlocking operation of exhaust fan.

C Ancillary Equipment:

- 01 Vollrath dish racks as follows;
 - a Four (4) model 52672 dish racks
 - b Two (2) model 52671 flatware racks
 - c Two (2) model 52669 pan racks

D Special Instructions:

- 01 Provide start-up inspection service by factory authorized service agent.
- 02 Provide factory authorized personnel for operation and maintenance training.
- 03 Eighteen (18) months parts and labor warranty from date of start-up. Warranty to include round trip drive time to jobsite.

ITEM NO. 48ED CONDENSATE HOOD

- A One (1) Fabricated, exhaust only, condensate canopy per drawings and details.

B To include:

- 01 3'-6" wide x 3'-6" long x 2'-6" high.
- 02 Type 304 stainless steel construction.
- 03 Condensate baffle.
- 04 Perimeter gutter.
- 05 Accessories required for installation.

- C Special instructions:
 - 01 Hang with ½" dia. steel hanger rods and turn buckles.
 - 02 Provide required structural members to suspend hood from overhead structure.
 - 03 Set hood bottom edge 6'-8" AFF.

ITEM NO. 49ED POT SINK & CLEAN DISHTABLE

- A One (1) - Fabricated, configuration per details and drawings.
- B To Include:
 - 01 Work surface 34" AFF.
 - 02 Stainless steel construction.
 - 03 Splash where adjacent to walls.
 - 04 Two (2) 18" x 26-1/2" x 14" deep sink compartments. Depth from rolled rim.
 - 05 One (1) 21" x 26-1/2" x 14" deep sink compartment. Depth from rolled rim.
 - 06 Drainboards.
 - 07 Open structure base.
 - 08 Undershelf where unobstructed.
 - 09 14 ga. stainless steel hat channel bracket below top for mounting hose reel.
 - 10 14 ga. stainless steel bracket below top for mounting hose reel mixing valve.
 - 11 Flanged foot where required by contract documents.
- C Ancillary Equipment:
 - 01 Component Hardware, rail shelf, configuration per details and drawings.
Construct with the following parts:
 - a Model J19-4962, wall brackets.
 - b 1" O.D., 16 ga., stainless steel tubular rails with welded capped ends.
 - c 16 ga., type 304, stainless steel panel on wall behind shelf, per detail.
 - 02 Two (2) Component Hardware, model KL34-8012, splash mount, faucet with 12" swing spout.
 - 03 Two (2) Component Hardware, model KL40-3400, mounting kit.
 - 04 Component Hardware, model KHR-1015-OSS, open body, stainless steel hose reel assembly.
 - 05 Component Hardware, model KVB-1045-198-CP, polished chrome, vacuum breaker assembly.
 - 06 Component Hardware, model KL43-4050-1 mixing valve.
 - 07 Three (3) Component Hardware, model DSS-8015, lever drain assembly.
- D Special Instructions:
 - 01 Mount rail shelf 21" above rolled rim of sink.
 - 02 Install faucet and mounting kit.
 - 03 Mount mixing valve into bracket.
 - 04 Mount hose reel below top per drawing.
 - 05 Anchor to floor.

ITEM NO. 50ED NUMBER NOT USED

ITEM NO. 51ED MOBILE PAN RACK

- A One (1) - Eagle Group, Quik-Set solid embossed shelving units.
- B To Include:
 - 01 Five (5) model HDS 24" x 42" 16 ga. stainless steel embossed shelves.
 - 02 Four (4) model HDSCP74-S 74" stainless steel posts. Modify post height to 72".
 - 03 Four (4) model CAHW4-SB 5" dia. polymer tired casters, two (2) with brakes.
- C Special Instructions:
 - 01 Set bottom shelf 10" AFF. Set additional shelves 18" O.C.

ITEM NO. 52ED NUMBER NOT USED

ITEM NO. 53ED JANITOR'S CABINET

- A One (1) - Eagle Group, model F1916-VSCS-D.

- B To Include:
 - 01 Stainless steel cabinet.
 - 02 Slanted top.
 - 03 Stainless steel hinged doors.
 - 04 12" wide shelf.
 - 05 Two (2) mop hangers.
 - 06 8" deep stainless steel mop sink.
 - 07 Sink location per drawing.
 - 08 Service faucet.
 - 09 Spray hose and bracket.
 - 10 Mop bucket storage compartment.

- C Special Instructions:
 - 01 Seal cabinet to floor and adjacent walls.
 - 02 Furnish service faucet, spray hose and bracket to Division 22 for installation.

ITEM NO. 54ED NUMBER NOT USED

ITEM NO. 55ED MOBILE DUMP STATION

- A One (1) - Lakeside, model SP-6575.

- B To Include:
 - 01 Stainless steel body.
 - 02 Splash on top at rear and sides.
 - 03 Trash chute.
 - 04 Dump sink.
 - 05 Open body at rear.
 - 06 7 gallon liquid waste container.
 - 07 Space for trash receptacle.
 - 08 Push handle.
 - 09 Corner bumpers.
 - 10 4" dia. swivel casters, two (2) with brakes.

- C Ancillary Equipment:
 - 01 Rubbermaid, model 1971258, gray, trash receptacle.

STANDING BAR

ITEM NO. 01SB WALK-IN KEG COOLER

- A One (1) - Mid-South Industries, Thermo-Kool, 32'- 1" long x 18'- 3" wide x 9'- 2" high.
Provide per details, drawings and PART 2-PRODUCTS Articles 2.09 and 2.11.

- B To include:
 - 01 Without floor.

- 02 11- 1/2" high foam screed.
- 03 Finished floor by General Contractor.
- 04 N.S.F. construction.
- 05 U.L. classified.
- 06 Class I foam.
- 07 36" x 78" door.
- 08 Hinge doors per drawings.
- 09 Frank 60" x 78" manual horizontal sliding cooler doors. Provide door with stainless steel chain lock, inside release, 14" x 24" view port and pull handles.
- 10 Chrome plated hardware.
- 11 Door with automatic closer, self-closing hinges, foot treadle, magnetic latch, magnetic gasket, cylinder lock and kickplates each side. Provide each door with three spring loaded hinges.
- 12 Component Hardware model VXS-LEDPK10N-PC series, LED, vapor-proof, 10W, light fixture with lamp and protective globe. Ceiling mounted in each compartment per drawings. Pre-wire to common connecting point, on walk-in roof. No exposed conduit on interior ceiling.
- 13 Heated threshold.
- 14 Apply 1/8" thick x 36" high, No. 6061-T6 hard-alloy aluminum diamond tread plate to all exposed exterior walls, interior walls, walk-thru door (interior and exterior) and sliding door (interior and exterior). Seal all joints with gray colored Dow-Corning 795 silicone sealant.
- 15 Closure panels at exposed sides per detail.
- 16 Angled wall trim at walls per detail.
- 17 Provide each compartment with Modularm, Corporation model 75LC , flush mount temperature alarm and walk-in light manager with dry contacts for connection to remote alarm (connection to remote alarm by Division 26) and probe-cord length required to extend from exterior front of assembly to a mounting position of the sensor within evaporator return air-stream. Pre-wire to common connecting point, (light connection), on walk-in roof. No exposed conduit on interior ceiling. Set light timer to leave lights on for 30 minutes.
- 18 Provide Kingman Industries, "Thermo-Curtain", model 6-2-04 curtain at each door opening. Vulene vinyl, breakaway loop, strips with rounded edges and 50% overlap. Include all mounting hardware.
- 19 Splice walk-in roof panels to accommodate ceiling suspension system.
- 20 Exterior ceiling suspension system with angle supports and mounting hardware.
- 21 Construct all special size panels using same methods, materials and locking system as used to construct standard panels. Special size panels must connect to and be locked with other panels, using joint design and locks identical to standard panels. Connecting of panels by any other method is not acceptable.

C Ancillary Equipment:

- 01 Refrigeration Design Technologies Inc., refrigeration systems as follows:
 - a MOZ-series , 208V-3ph, pre-assembled remote, with fused disconnect and using R407A refrigerant in refrigeration system. Provide Eco-Smart demand defrost controllers with expansion valve, solenoid valve pre-wired and mounted on evaporators. Job site installation to consist of piping condensing unit to evaporator, evacuating and charging units with refrigerant.
 - b Cooler, +35°F.: Model MOZ045M63C, (4.0 HP), 208V-3ph, medium temp, air-cooled compressor. Two (2) model ADT-140, 120V-1ph, evaporator. Cooler defrost to be "Ecosmart" type with positive refrigeration cycle shutdown.
 - c Refrigeration systems with winter controls and stainless steel, exterior weather-proof housings.

D Special Instructions:

- 01 Installation must be supervised by factory personnel or factory authorized personnel.
- 02 Install walk-in walls into building floor recess per drawings.
- 03 Level and square exterior wall and partition floor screeds. Anchor screeds to slab recess.
- 04 Prior to assembly of insulated panels, apply 1/4" to 3/8" bead of Dow-Corning 795 silicone sealant (color gray or white to match panel finish), at exterior side of panel tongue and groove edge.

CHEROKEE HARD ROCK CASINO 4

- 05 Protect exposed surface of panels from installation of concrete floor and other work. Provide protective covering on walls during installation of concrete in or around walk-in. Door(s) must be left open to ventilate interior when concrete is installed in walk-in interior.
- 06 Install condensing unit on building roof per details, drawings and manufactures recommendations.
- 07 Install evaporator coils as indicated on drawings per manufactures recommendations.

ITEM NO. 02SB WALK-IN SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts. Section below evaporator provide three (3) shelves and four (4) 63" posts.
- B Each section to include:
 - 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adust shelves.
 - 03 Four (4) posts.
- C Sections:
 - 01 Five (5) 21" x 48".
- D Special instructions:
 - 01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.
 - 02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.
 - 03 Section below evaporator include two (2) Quad-Truss and one (1) Quad-Adjust shelves.

ITEM NO. 03BS KEG RACK

- A One (1) lot - New Age Industrial Corp., "Adjust-A-Shelf" T-Bar Series aluminum shelving. Each section free standing with three (3) shelves and 76" posts. Section below evaporator provide with two (2) shelves and 54" posts.
- B To include:
 - 01 1 1/2" x 1 3/4" x .070" aluminum tubing frame.
 - 02 1 1/4" x 2 1/4" x .100" aluminum T-Bar laterals.
 - 03 Fully welded.
 - 04 Load capacity 1,500 lbs per shelf.
- C Sections:
 - 01 Four (4) 18" x 36"
 - 02 Fifteen (15) 18" x 60".
- D Special instructions:
 - 01 Set bottom shelf 10" AFF.
 - 02 Mount intermediate and top shelves as instructed by Owner.

ITEM NO. 04SB STORAGE SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts.
- B Each section to include:
 - 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adust shelves.

03 Four (4) posts.

C Sections:

01 Three (3) 21" x 48".

D Special instructions:

01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.

02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.

ITEM NO. 05SB BACK BAR

A One (1) - By Division 06.

ITEM NO. 06SB BEER SYSTEM

A One (1) lot - Chill-Rite, "Millennium" beer system.

B To include:

01 Three (3) Model MLN-75, 3/4 h.p., air cooled, glycol chiller.

02 Floor mounted chiller stand.

03 Chill-Rite glycol jumper.

04 Thirty four (34) CR32 cold blocks

05 ST-.5" trunk line housing with eight (8) product lines and two (2) coolant lines. Trunk line NSF-51/NSF-61 compliant. Length as required for complete installation.

06 Twelve (12) beer "Y"s.

07 Thirty four (34) single regulator plate assembly with FOB's.

08 Six (6) single regulator plate assembly without FOB's.

09 Six (6) 7.5 gallon stainless steel pressurized syrup cans.

10 Copper wrapped tower fronts (Standing Bar).

11 Model CWM-36-S/S stainless steel Beer Dispensing Towers. Each tower to include brass faucets with black handles (Standing Bar). Vertically offset mounting of faucets per Owner's Instruction.

12 Custom, drop-in, counter mounted drip pan with three (3) rinsers (Standing Bar).

13 Model DF-THT-8-S/S stainless steel Beer Dispensing Tower (Casino Bar).

14 Two (2) THT-8-DP-S/S drip pan with rinsers (Casino Bar).

15 Two (2) 4 product Bottoms-Up Beer Dispenser (Concession Stand).

16 High pressure CO2 regulator.

17 USP Food Grade Propylene Glycol. Quantity as required for complete installation.

18 Parts, accessories, and fittings for complete installation.

C Special instructions:

01 Provide factory or factory authorized installation.

02 Install beer system with components, completely connected and operational.

03 Mount CWM Beer Dispensing Towers on Item No. 01SB, Walk-In Keg Cooler.

04 Mount THT Beer Dispensing Tower on Item No. 01CB, Back-Bar.

05 Mount Bottoms-Up Beer Dispensing system on Item No. 13CS, Bar.

04 Tapping equipment by Owner.

ITEM NO. 07SB DRAIN BOARD W/ GLASS RINSER

A One (1) lot - Chill-Rite. Included in Item No. 06SB, Beer System.

B Special Instructions:

01 Install into top of Item No. 05SB, Back-Bar.

02 Install drip tray per manufactures recommendations.

03 Coordinate installation with Item No. 06SB, Beer System, dispensing towers.

04 Coordinate installation with Millwork Contractor.

ITEM NO. 08SB BACK-BAR REFRIGERATOR

- A Two (2) - Glastender, model BB84, self-contained.
- B To include:
 - 01 Stainless steel top.
 - 02 Black vinyl finish on front and door.
 - 03 Black vinyl finish on sides.
 - 04 Stainless steel interior finish.
 - 05 Hinge door per drawing.
 - 06 Door lock. Key all locks alike.
 - 07 Compressor location per drawing.
 - 08 4" dia. caster set.
- C Special Instructions:
 - 01 Coordinate caster height with construction of Item No. 05SB, Back-Bar.
 - 02 Install into base of Item No. 05SB, Back-Bar.
 - 03 Coordinate installation with Millwork Contractor.

ITEM NO. 09SB BOTTLE WELL

- A Four (4) - Future.

ITEM NO. 10SB PALLET

- A Two (2) - By Owner.

ITEM NO. 11SB MUG CHILLER

- A Two (2) - Perlick, model FR60.
- B To include:
 - 01 Stainless steel finish top and sliding door.
 - 02 Black vinyl finish on front and sides.
 - 03 Stainless steel finish on interior.
 - 04 Two (2) layers of shelves.
 - 05 Floor racks.
 - 06 3-3/4" dia. caster set.
- C Special Instructions:
 - 01 Coordinate caster height with construction of Item No. 05SB, Back-Bar.
 - 02 Install into base of Item No. 07FB, Back-Bar.
 - 03 Coordinate installation with Millwork Contractor.

ITEM NO. 12SB BAR

- A One (1) - By Division 06.

ITEM NO. 13SB SPEED GUN

- A Eight (8) - By Owner.

ITEM NO. 14SB BAR STATION

- A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.
- B To include:
 - 01 Model DBA-12 drainboard.
 - 02 Model IFCA-90 corner drainboard.
 - 03 Model DBA-6 drainboard.
 - 04 Model IBA-24-CP10, ice chest with built-in ten (10) circuit cold plate.
 - 05 Two (2) BW3 bottle wells with sliding cover.
 - 06 Model DBA-12 drainboard.
 - 07 Model DBGR-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
 - 08 Model BSA-12, blender station with sink, drain and junction box for duplex GFI receptacle.
 - 09 Model DSR-48 speed rail.
- C Ancillary Equipment:
 - 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.
 - 02 Mount 120V-1ph, 20A, GFI duplex receptacle into junction box below blender shelf.
- D Special Instructions:
 - 01 Join sections together as one unitized integral bar station per drawings.
 - 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
 - 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 15SB CASH REGISTER

- A Four (4) - By Owner.

ITEM NO. 16SB GLASSWASHER

- A Two (2) - Champion, model CG-CW.
- B To Include:
 - 01 Clockwise rotation.
 - 02 Stainless steel top, front and side panels.
 - 03 Front access door.
 - 04 Fully automatic.
 - 05 Regulated electric heat (3.0KW).
 - 06 Detergent, sanitizer and rinse aid pumps.
 - 07 Drain tray and waste collector.
 - 08 Water pressure reducing valve.
 - 09 Water hammer arrestor.
 - 10 Eighteen (18) months parts and labor warranty from date of start-up. Warranty to include round trip drive time to jobsite.

ITEM NO. 17SB BAR STATION

- A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.
- B To include:
 - 01 Model DBB-12 drainboard.
 - 02 Model HSA-12-D hand sink with soap dispenser, towel dispenser and drain.
 - 03 Model DBGR-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
 - 04 Model DBA-12 drainboard.
 - 05 Model IBA-30-CP10, ice chest with built-in ten (10) circuit cold plate.

- 06 Two (2) BW3 bottle wells with sliding cover.
- 07 Model DBA-24 drainboard.
- 08 Model DBA-12 drainboard.
- 09 Model DSR-36 speed rail.
- 10 Model DSR-42 speed rail.

C Ancillary Equipment:

- 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.

D Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 18SB BAR STATION

A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.

B To include:

- 01 Model IBA-24-CP10, ice chest with built-in ten (10) circuit cold plate.
- 02 Two (2) BW3 bottle wells with sliding cover.
- 03 Model DBA-12 drainboard.
- 04 Model DBG-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
- 05 Model BSA-12, blender station with sink, drain and junction box for duplex GFI receptacle.
- 06 Model DSR-36 speed rail.

C Ancillary Equipment:

- 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.
- 02 Mount 120V-1ph, 20A, GFI duplex receptacle into junction box below blender shelf.

D Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 19SB BAR STATION

A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.

B To include:

- 01 Model DBB-12 drainboard.
- 02 Model DBG-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
- 03 Model DBA-12 drainboard.
- 04 Model IBA-30-CP10, ice chest with built-in ten (10) circuit cold plate.
- 05 Two (2) BW3 bottle wells with sliding cover.
- 06 Model DBA-12 drainboard.
- 07 Model IFCA-90 corner drainboard.
- 08 Model DSR-54 speed rail.

C Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 20SB WORK TABLE

- A One (1) - Fabricated, configuration per details and drawings.
- B To include:
 - 01 Work surface 30" AFF.
 - 02 Stainless steel construction.
 - 03 Marine edge top.
 - 04 10" x 12" x 8" deep dump sink.
 - 05 10" x 12" x 10" deep hand sink compartment.
 - 06 Splash at hand sink, per detail.
 - 07 Open structure base.
 - 08 Corner legs with flanged feet.
- C Ancillary Equipment:
 - 01 Two (2) Component Hardware, model KL83-4100-SE1, deck mount, faucet with 3-1/2" swivel spout.
 - 02 Two (2) Component Hardware, model E32-4900, flat strainer drain.
- D Special instructions:
 - 01 Coordinate height of table top with surface of conveyor of Item No. 21SB, Pass-Under Glasswasher .
 - 02 Anchor table to floor.

ITEM NO. 21SB PASS-UNDER GLASSWASHER

- A One (1) - Champion, model CG-2-CW.
- B To Include:
 - 01 Clockwise rotation.
 - 02 Stainless steel top, front and side panels.
 - 03 Left side access door.
 - 04 Fully automatic.
 - 05 Regulated electric heat (3.0KW).
 - 06 Detergent, sanitizer and rinse aid pumps.
 - 07 Drain tray and waste collector.
 - 08 Water pressure reducing valve.
 - 09 Water hammer arrestor.
 - 10 Eighteen (18) months parts and labor warranty from date of start-up. Warranty to include round trip drive time to jobsite.

ITEM NO. 22SB COUNTER

- A One (1) - By Division 06.

ITEM NO. 23SB CASH REGISTER

- A Three (3) - By Owner.

ITEM NO. 24SB LIQUOR SYSTEM

- A One (1) lot - Chill-Rite. Included in Item No. 06SB, Beer System.

CASINO BAR

ITEM NO. 01CB BACK BAR

A One (1) - By Division 06.

ITEM NO. 02CB PASS-THRU BACK BAR REFRIGERATOR

A Two (2) - Glastender, model PT36, pass-thru, self-contained.

B To include:

- 01 No finish top.
- 02 Black vinyl finish on front and door.
- 03 Black vinyl finish on sides.
- 04 Stainless steel interior finish.
- 05 Hinge door per drawing.
- 06 Door lock. Key all locks alike.
- 07 Compressor location per drawing.

C Ancillary Equipment:

- 01 14 ga. stainless steel, channel shaped, 4" high toe base (coordinate final base height with back bar construction) per details. Set base in continuous bead of clear silicone sealant at floor.
- 02 18 ga. stainless steel angle shaped trim on Pass-Thru Back Bar Refrigerator at opening of counter. Trim to frame cabinet opening. Secure to Pass-Thru Back Bar Refrigerator and seal to counter. Trim to be full height and width of refrigerator cabinet body.

D Special Instructions:

- 01 Restrain excess cord length.
- 02 Install under top of Item No. 01CB Back-Bar. Coordinate installation with Millwork Contractor.

ITEM NO. 03CB BEER SYSTEM

A One (1) lot - Chill-Rite. Included in Item No. 06SB, Beer System.

B Special Instructions:

- 01 Install into top of Item No. 01CB, Back-Bar.
- 02 Install drip tray per manufactures recommendations.
- 03 Coordinate installation with Item No. 06SB, Beer System, dispensing towers.
- 04 Coordinate installation with Millwork Contractor.

ITEM NO. 04CB CUP DISPENSER

A Five (5) Dispense-Rite, model ADJ-NS, Series.

B To Include:

- 01 Stainless steel finish.
- 02 Surface mount.
- 03 16 ga. stainless steel support bracket below top for mounting cup dispensers. Size and shape to accommodate cup dispensers. Secure cup dispenser mounting brackets to support bracket with stainless steel screws and chrome plated, locking, cap nuts. Submit detail.

C Special Instructions:

- 01 Verify Owner's cup size (s).
- 02 Adjust cup dispensers to accommodate Owner's cups.
- 03 Mount cup dispenser on Item No. 01CB, Back Bar.

ITEM NO. 05CB BAR

A One (1) - By Division 06.

ITEM NO. 06CB SPEED GUN

A Eight (8) - By Owner.

ITEM NO. 07CB BAR STATION

A One (1) - Glaster, bar station, configuration per drawings. Consisting of the following components.

B To include:

- 01 Model DBA-12 drainboard.
- 02 Model IBA-36-CP10, ice chest with built-in ten (10) circuit cold plate.
- 03 Two (2) BW3 bottle wells with sliding cover.
- 04 Model DBA-12 drainboard.
- 05 Model DBGR-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
- 06 Model HSA-12-D hand sink with soap dispenser, towel dispenser and drain.
- 07 Model DBB-12 drainboard.
- 08 Two (2) Model DSR-30 speed rail.

C Ancillary Equipment:

- 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.

D Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 08CB CASH REGISTER

A Four (4) - By Owner.

ITEM NO. 09CB GLASSWASHER

A Two (2) - Champion, model CG-CW.

B To Include:

- 01 Clockwise rotation.
- 02 Stainless steel top, front and side panels.
- 03 Front access door.
- 04 Fully automatic.
- 05 Regulated electric heat (3.0KW).
- 06 Detergent, sanitizer and rinse aid pumps.
- 07 Drain tray and waste collector.
- 08 Water pressure reducing valve.
- 09 Water hammer arrestor.
- 10 Eighteen (18) months parts and labor warranty from date of start-up. Warranty to include round trip drive time to jobsite.

ITEM NO. 10CB NUMBER NOT USED

ITEM NO. 11CB BAR STATION

A One (1) - Glaster, bar station, configuration per drawings. Consisting of the following components.

- B To include:
- 01 Model BSA-12, blender station with sink, drain and junction box for duplex GFI receptacle.
 - 02 Model DBGR-24-RS glass rack storage with drainboard top and sliding intermediate and bottom shelves.
 - 03 Model DBA-12 drainboard.
 - 04 Model IBA-36-CP10, ice chest with built-in ten (10) circuit cold plate.
 - 05 Two (2) BW3 bottle wells with sliding cover.
 - 06 Model DBA-12 drainboard.
 - 07 Model IFCA-90 corner drainboard.
 - 08 Model DBA-12 drainboard.
 - 09 Two (2) Model DSR-30 speed rail.
- C Ancillary Equipment:
- 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.
 - 02 Mount 120V-1ph, 20A, GFI duplex receptacle into junction box below blender shelf.
- D Special Instructions:
- 01 Join sections together as one unitized integral bar station per drawings.
 - 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
 - 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 12CB BAR STATION

- A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.
- B To include:
- 01 Model DBA-12 drainboard.
 - 02 Model IBA-24-CP10, ice chest with built-in ten (10) circuit cold plate.
 - 03 Two (2) BW3 bottle wells with sliding cover.
 - 04 Model DBA-18 drainboard.
 - 05 Model IFCA-90 corner drainboard.
 - 06 Model DBA-18 drainboard.
 - 07 Model BSA-12, blender station with sink, drain and junction box for duplex GFI receptacle.
 - 08 Model DSR-48 speed rail.
- C Ancillary Equipment:
- 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.
 - 02 Mount 120V-1ph, 20A, GFI duplex receptacle into junction box below blender shelf.
- D Special Instructions:
- 01 Join sections together as one unitized integral bar station per drawings.
 - 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
 - 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 13CB BAR STATION

- A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.
- B To include:
- 01 Model DBB-12 drainboard.
 - 02 Model HSA-12-D hand sink with soap dispenser, towel dispenser and drain.
 - 03 Model DBA-12 drainboard.
 - 04 Model IBA-36-CP10, ice chest with built-in ten (10) circuit cold plate.
 - 05 Two (2) BW3 bottle wells with sliding cover.
 - 06 Model DBA-12 drainboard.

07 Two (2) Model DSR-30 speed rail.

C Ancillary Equipment:

01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.

D Special Instructions:

01 Join sections together as one unitized integral bar station per drawings.

02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.

03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 14CB UNDERBAR REFRIGERATOR

A One (1) - Glastender, model BB60, self-contained.

B To include:

01 Stainless steel finish on top.

02 Black vinyl finish on front and door.

03 Black vinyl finish on sides.

04 Stainless steel interior finish.

05 Hinge door per drawing.

06 Door lock. Key all locks alike.

07 Compressor location per drawing.

08 2-1/2" dia. caster set.

C Special Instructions:

01 Install under Item No. 05CB, Bar. Coordinate installation with Millwork Contractor.

02 Coordinate installation with Item No. 08CB Cash Register. Cash Register must fit below bar top unobstructed.

ITEM NO. 15CB DRAIN BOARD

A One (1) - Glastender, configuration per drawings. Consisting of the following components.

B To include:

01 Model DBA-18 drainboard.

02 Model IFCA-90 corner drainboard.

C Special Instructions:

01 Join sections together as one unitized integral bar station per drawings.

02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.

03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 16CB UNDERBAR REFRIGERATOR

A One (1) - Glastender, model BB84, self-contained.

B To include:

01 Stainless steel finish on top.

02 Black vinyl finish on front and door.

03 Black vinyl finish on sides.

04 Stainless steel interior finish.

05 Hinge door per drawing.

06 Door lock. Key all locks alike.

07 Compressor location per drawing.

08 2-1/2" dia. caster set.

- C Special Instructions:
 - 01 Coordinate caster height with construction of Item No. 05CB, Bar.
 - 02 Install into base of Item No. 05CB, Bar.
 - 03 Coordinate installation with Millwork Contractor.

ITEM NO. 17CB UNDERBAR REFRIGERATOR

- A One (1) - Glastender, model BB60, self-contained.

- B To include:
 - 01 Stainless steel finish on top.
 - 02 Black vinyl finish on front and door.
 - 03 Black vinyl finish on sides.
 - 04 Stainless steel interior finish.
 - 05 Hinge door per drawing.
 - 06 Door lock. Key all locks alike.
 - 07 Compressor location per drawing.
 - 08 2-1/2" dia. caster set.

- C Special Instructions:
 - 01 Coordinate caster height with construction of Item No. 05CB, Bar.
 - 02 Install into base of Item No. 05CB, Bar.
 - 03 Coordinate installation with Millwork Contractor.
 - 04 Coordinate installation with Item No. 08CB Cash Register. Cash Register must fit below bar top unobstructed.

BIB STATION

ITEM NO. 01BB ICE MAKER W/ TRANSPORT CART

- A Two (2) - Hoshizaki, model KM-901MAJ, air cooled .

- B To Include:
 - 01 Crescent Cube ice.

- C Ancillary Equipment:
 - 01 Water hammer arrestor.
 - 02 Water pressure reducing valve.
 - 03 Two (2) Everpure model EV9325-23 "Insurice" TRIPLE PF-I4000 water filter system.
 - 04 San Jamar, model SI9000, Saf-T-Scoop Guardian System.
 - 05 Follett Corp. model DEV1650SG-60-75, bin with stainless steel exterior and base. Provide SmartCART 75 with three (3) totes, ice paddle, ice rake and hanging bracket.

- D Special Instructions:
 - 01 Install ice maker on bin. Include all accessories required for complete installation.
 - 02 Locate front of ice maker flush with front of ice bin.
 - 03 Mount water filter on wall with 16 ga. stainless steel mounting plate. Size and shape to accommodate filter bracket. Attach mounting plate to wall with stainless steel pan head screws. Weld stainless steel keyhole studs to mounting plate and attach filter bracket.
 - 04 Mount water filter on bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate filter bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach filter bracket.

CHEROKEE HARD ROCK CASINO 4

- 05 Mount scoop hanging bracket on side of bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate hanging bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach hanging bracket.

ITEM NO. 02BB NUMBER NOT USED

ITEM NO. 03BB LIQUOR SYSTEM

- A Seven (7) - By Owner.

ITEM NO. 04BB BAG RACK

- A Fifteen (15) - By Owner.

ITEM NO. 05BB CARBONATOR

- A Fifteen (15) - By Owner.

ITEM NO. 06BB STORAGE SHELVING

- A One (1) lot - Eagle Group, "Quad-Adjust" with "EAGLEgard" epoxy finish. Each section free standing with five (5) shelves and four (4) 86" posts.
- B Each section to include:
- 01 Two (2) QuadTruss shelves.
 - 02 Three (3) Quad-Adjust shelves.
 - 03 Four (4) posts.
- C Sections:
- 01 One (1) 21" x 42"
 - 02 Nine (9) 21" x 48"
- D Special instructions:
- 01 Set bottom shelf 10" AFF. Set additional shelves 17" O.C.
 - 02 Set QuadTruss shelves top and bottom. Remaining shelves Quad-Adjust.

ITEM NO. 07BB WALL SHELF

- A One (1) lot - Fabricated, configuration per details and drawings.
- B To Include:
- 01 16 ga. stainless steel, fully welded, wall mounted shelf on cantilever brackets.
- C Section:
- 01 One (1) 18" x 144"
- D Special Instructions:
- 01 Coordinate mounting height of shelf with Item No. 04BB, Bag Rack.

ITEM NO. 08BB WALL SHELF W/ MOP HANGERS

- A One (1) - Eagle Group, model USO830-16/3 MOD.

- B To Include:
 - 01 16 ga. type 304 stainless steel construction.
 - 02 Wall brackets welded to shelf.
 - 03 Three (3) mop hangers.
 - 04 Two (2) hooks.

- C Special Instructions:
 - 01 Set shelf bottom edge 72" AFF.

EVENT CENTER

ITEM NO. 01EC ICE MAKER W/ TRANSPORT CART

- A Two (2) - Hoshizaki, model KM-901MAJ, air cooled .
- B To Include:
 - 01 Crescent Cube ice.
- C Ancillary Equipment:
 - 01 Water hammer arrestor.
 - 02 Water pressure reducing valve.
 - 03 Two (2) Everpure model EV9325-23 "Insurice" TRIPLE PF-I4000 water filter system.
 - 04 San Jamar, model SI9000, Saf-T-Scoop Guardian System.
 - 05 Follett Corp. model DEV1650SG-60-75, bin with stainless steel exterior and base. Provide SmartCART 75 with three (3) totes, ice paddle, ice rake and hanging bracket.
- D Special Instructions:
 - 01 Install ice maker on bin. Include all accessories required for complete installation.
 - 02 Locate front of ice maker flush with front of ice bin.
 - 03 Mount water filter on each side of bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate filter bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach filter bracket.
 - 04 Mount scoop hanging bracket on side of bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate hanging bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach hanging bracket.

ITEM NO. 02EC REFRIGERATOR

- A One (1) - Continental Refrigerator, model DL1R-SS-HD.
- B To Include:
 - 01 Half height doors.
 - 02 Hinge doors per drawings.
 - 03 One (1) extra shelf per section.
 - 04 Cord and plug.
- C Ancillary Equipment:
 - 01 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor.

- D Special Instructions:
01 Anchor toe base to refrigerator.

ITEM NO. 03EC BEVERAGE TABLE

- A One (1) - Fabricated, configuration per details and drawings.
- B To include:
01 Work surface 36" AFF.
02 Stainless steel construction.
03 Top with marine edges.
04 Splash where adjacent to walls and equipment.
05 Drain trough per details and drawings.
06 21" x 21" x 2" deep recessed top with 16" x 21" x 8" deep sink compartment per detail.
07 Punch top with hole(s) for Base Outlet.
08 Open structure base.
09 Parking space in base for Item No. 04EC Mobile Glass Rack.
10 Corner legs with flanged feet.
11 Flanged foot where required by the contract documents.
12 Extend drain line and terminate above floor drain.
13 Elevated shelf per details and drawings. Table mounted 21" above top.
- C Ancillary Equipment:
01 Component Hardware, model KL53-1000-BR, splash mount, spray assembly with wall bracket.
02 Component Hardware, model KL50-Y002-GF, spray valve with water nozzle.
03 Component Hardware, model KL55-7012, add-on-faucet with 12" swing spout.
04 Component Hardware, model KL40-1000, mounting kit.
05 Two (2) Component Hardware, model K50-X125 base with KL50-X122 adapter, deck mount, base outlet.
06 Component Hardware, model DSS-8015 lever drain with overflow assembly.
- D Special instructions:
01 Coordinate clearance between faucet body and sink recess. Glass rack must be removable unobstructed.
02 Install spray assembly and mounting kit.
03 Mount spray assembly wall bracket per detail.
04 Install Base Outlet behind Coffee Urn and Iced Tea Brewer.
05 Brace top to support counter mounted equipment.
06 Park Item No. 04EC, Mobile Glass Racks in base.
07 Anchor table to floor.

ITEM NO. 04EC MOBILE GLASS RACK

- A Six (6) - Cambro, model CD2020.
- B Special Instructions:
01 Color selected, by Architect, from manufactures standard colors.

ITEM NO. 05EC ICED TEA BREWER

- A Two (2) - By Owner.

ITEM NO. 06EC COFFEE URN

- A Two (2) - By Owner.

ITEM NO. 07EC BEVERAGE TABLE

- A One (1) - Fabricated, configuration per details and drawings.

- B To include:
 - 01 Work surface 36" AFF.
 - 02 Stainless steel construction.
 - 03 Top with marine edges.
 - 04 Drain trough per details and drawings.
 - 05 21" x 21" x 2" deep recessed top with 16" x 21" x 8" deep sink compartment per detail.
 - 06 Punch top with hole(s) for Base Outlet.
 - 07 Open structure base.
 - 08 Parking space in base for Item No. 04EC Mobile Glass Rack.
 - 09 Corner legs with flanged feet.
 - 10 Flanged foot where required by the contract documents.
 - 11 Extend drain line and terminate above floor drain.
 - 12 Elevated shelf per details and drawings. Table mounted 21" above top.

- C Ancillary Equipment:
 - 01 Component Hardware, model KL53-1000-BR, splash mount, spray assembly with wall bracket.
 - 02 Component Hardware, model KL50-Y002-GF, spray valve with water nozzle.
 - 03 Component Hardware, model KL55-7012, add-on-faucet with 12" swing spout.
 - 04 Component Hardware, model KL40-1000, mounting kit.
 - 05 Two (2) Component Hardware, model K50-X125 base with KL50-X122 adapter, deck mount, base outlet.
 - 06 Component Hardware, model DSS-8015 lever drain with overflow assembly.

- D Special instructions:
 - 01 Coordinate clearance between faucet body and sink recess. Glass rack must be removable unobstructed.
 - 02 Install spray assembly and mounting kit.
 - 03 Mount spray assembly wall bracket per detail.
 - 04 Install Base Outlet behind Coffee Urn and Iced Tea Brewer.
 - 05 Brace top to support counter mounted equipment.
 - 06 Park Item No. 04EC, Mobile Glass Racks in base.
 - 07 Anchor table to floor.

CONCESSION STAND

ITEM NO. 01CS BACK-UP COUNTER

- A One (1) - Fabricated, configuration per details and drawings.

- B To Include:
 - 01 Work surface 42" AFF.
 - 02 Stainless steel construction.
 - 03 Splash where adjacent to walls.
 - 04 Closed body base.
 - 05 Removable access panels, per details.
 - 06 Two (2) 208V-1ph, 20A receptacle in base with stainless steel cover for connecting Item No. 02CS Drawer Warmer.
 - 07 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor.

- C Special instructions:
 - 01 Install Item No. 02CS, Drawer Warmer into base.

ITEM NO. 02CS DRAWER WARMER

- A Two (2) - Hatco, model HDW-3B, 208V-1ph, built-in warmer.
- B To Include:
 - 01 Stainless steel front.
 - 02 Cord and plug.
- C Special Instructions:
 - 01 Install per manufactures recommendations.
 - 02 Install into base of Item No. 02CS, Back-Up Counter.

ITEM NO. 03CS REFRIGERATED MERCHANDISER

- A One (1) - Beverage Air, model CT96HC-1-B
- B To include:
 - 01 Black textured exterior finish.
 - 02 White epoxy interior finish.
 - 03 Three (3) epoxy coated shelves.
 - 04 Door lock.
 - 05 Cord and plug.
- C Special Instructions:
 - 01 Install on Item No. 01CS, Back-Up Counter.

ITEM NO. 04CS HEATED CABINET

- A One (1) - Hatco, model FDWD-1.
- B To Include:
 - 01 Hinge door per drawings.
 - 02 3-tier pretzel tree.
 - 03 Cord and plug.
 - 04 Color selected, by Architect, from manufacture's standard colors.
- C Special instructions:
 - 01 Install on Item No. 01CS, Back-up Counter.
 - 02 Restrain excess cord length.

ITEM NO. 05CS POPCORN POPPER

- A One (1) - Gold Medal Products, model 2024ST-Econo.
- B To Include:
 - 01 16-oz popper kettle.
 - 02 Stainless steel dome.
 - 03 Heated corn deck.
 - 04 Cord and plug with matching electrical receptacle.
- C Special instructions:
 - 01 Install on Item No. 01CS, Back-up Counter.

- 02 Restrain excess cord length.
- 03 Furnish electrical receptacle to Division 26 for installation.

ITEM NO. 06CS MOBILE HOT CABINET

- A One (1) - Cres-Cor, model H-137-SUA-12D.
- B To Include:
 - 01 Hinge door per drawing.
 - 02 Perimeter bumper.
 - 03 Polyurethane tired casters.

ITEM NO. 07CS ICE MAKER

- A One (1) - Hoshizaki, model KML-500MAJ, air cooled .
- B To Include:
 - 01 Crescent ice.
- C Ancillary Equipment:
 - 01 Water hammer arrestor.
 - 02 Water pressure reducing valve.
 - 03 Everpure model EV9324-22 "Insurice" TWIN PF-I2000 water filter system.
 - 04 San Jamar, model SI7700, Saf-T-Scoop Guardian System.
 - 05 Follett Corp. model 425-30, bin with stainless steel exterior and 6" stainless steel legs.
- D Special Instructions:
 - 01 Install ice maker on bin. Include all accessories required for complete installation.
 - 02 Locate front of ice maker flush with front of ice bin.
 - 03 Mount water filter on wall with 16 ga. stainless steel mounting plate. Size and shape to accommodate filter bracket. Attach mounting plate to wall with stainless steel pan head screws. Weld stainless steel keyhole studs to mounting plate and attach filter bracket.
 - 04 Mount scoop hanging bracket on side of bin with 16 ga. stainless steel mounting plate. Size and shape to accommodate hanging bracket. Weld threaded stainless steel studs to ice bin and attach mounting plate with chrome plated, locking, cap nuts. Weld stainless steel keyhole studs to mounting plate and attach hanging bracket.

ITEM NO. 08CS BAR STATION

- A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.
- B To include:
 - 01 Model IFCA-90 corner drainboard.
 - 02 Model DBA-12 drainboard.
 - 03 Model TSA-48-S, three compartment sink with swing spout faucet and drain.
 - 04 Model DBA-12 drainboard.
 - 05 Model HSA-12-D hand sink with soap dispenser, towel dispenser and drain.
- C Ancillary Equipment:
 - 01 Component Hardware, model KL45-4006-SE1, splash mount, faucet with 6" swing spout.
- D Special Instructions:
 - 01 Join sections together as one unitized integral bar station per drawings.
 - 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
 - 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 09CS ICE & CARBONATED BEVERAGE DISPENSER

A One (1) - By Owner.

ITEM NO. 10CS NUMBER NOT USED

ITEM NO. 11CS CUP DISPENSER

A Nine (9) Dispense-Rite, model ADJ-NS, Series.

B To Include:

- 01 Stainless steel finish.
- 02 Surface mount.
- 03 16 ga. stainless steel support bracket mounting cup dispensers. Size and shape to accommodate cup dispensers. Attach support bracket with chrome plated, locking, cap nuts. Secure cup dispenser mounting brackets to support bracket with stainless steel screws and chrome plated, locking, cap nuts. Submit detail.

C Special Instructions:

- 01 Verify Owner's cup size (s).
- 02 Adjust cup dispensers to accommodate Owner's cups.
- 03 Mount cup dispenser on Item No. 09CS, Ice & Carbonated Beverage Dispenser.
- 04 Mount cup dispenser on Item No. 14CS, Bar Station.
- 05 Mount cup dispenser on Item No. 15CS, Bar Station.

ITEM NO. 12CS CASH REGISTER

A Two (2) - By Owner.

ITEM NO. 13CS BAR

A One (1) - By Division 06.

ITEM NO. 14CS BAR STATION

A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.

B To include:

- 01 Model PCB-24, cashier's stand, hinge door per drawings.
- 02 Model IBA-24-CP10, ice chest with built-in ten (10) circuit cold plate.
- 03 Two (2) BW3 bottle wells with sliding cover.
- 04 Model DBA-18 drainboard.
- 05 Model SSR-24 speed rail.

C Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 15CS BAR STATION

A One (1) - Glastender, bar station, configuration per drawings. Consisting of the following components.

B To include:

- 01 Model DBA-18 drainboard.
- 02 Model IBA-24-CP10, ice chest with built-in ten (10) circuit cold plate.

- 03 Two (2) BW3 bottle wells with sliding cover.
- 04 Model PCB-24, cashier's stand, hinge door per drawings.
- 05 Model SSR-24 speed rail.

C Special Instructions:

- 01 Join sections together as one unitized integral bar station per drawings.
- 02 Assemble sections, as shown on drawings, into single unit using common leg. Minimize number of legs.
- 03 Submit shop drawing of single unit bar station. Coordinate drawing with bar die and top.

ITEM NO. 16CS SPEED GUN

- A Four (4) - By Owner.

ITEM NO. 17CS BEER DISPENSER

One (1) lot - Chill-Rite. Included in Item No. 06SB, Beer System.

A Special Instructions:

- 01 Install into top of Item No. 13CS, Bar.
- 02 Install drip tray per manufactures recommendations.
- 03 Coordinate installation with Item No. 06SB, Beer System, dispensing system.
- 04 Coordinate installation with Millwork Contractor.

LOWER LEVEL COMPLIMENTARY BEVERAGE STATION

ITEM NO. 01CL BEVERAGE COUNTER

- A One (1) - Fabricated, configuration per drawings and details.

B To Include:

- 01 Work surface 34" AFF.
- 02 Engineered stone top and splash constructed per details. Stone selected, by Architect, from manufacture's standard colors.
- 03 Splash where adjacent to walls.
- 04 Cut and polish hole(s) in top for carbonated beverage lines. Coordinate size/location with Ice & Carbonated Beverage Dispenser. Polish hole(s) in top for extending beverage lines, cord and plug to services below top. Coordinate size/location with Ice & Carbonated Beverage Dispenser.
- 05 Cut and polish hole(s) in top for Base Outlet.
- 06 Closed body base with plastic laminate covered front, per details. Plastic laminate selected, by Architect, from manufacture's standard colors. Stainless steel ends.
- 07 Carbonator storage compartments. 14 ga. stainless steel pan per details. Removable pan recessed into toe base, per details and drawings. Storage compartment enclosed with hinged door.
- 08 Intermediate and bottom shelves enclosed with hinged doors per details and drawings.
- 09 Bottom shelf enclosed with hinged doors.
- 10 Plastic laminate doors per details. Each door with lock, keyed alike.
- 11 Utility compartment located per drawings.
- 12 Pre-pipe brass gate valve, below top, to each base outlet.
- 13 Pre-pipe Base Outlets to a common connection point in utility compartment.
- 14 Extend drain lines to utility compartment and terminate at opening above floor drain.
- 15 Two (2) 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Carbonator.

CHEROKEE HARD ROCK CASINO 4

- 16 Two (2) 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Ice & Carbonated Beverage Dispenser.
- 17 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor. Notch base at floor drain and seal base to floor. Floor drain must be accessible when panel is removed.
- 18 Pre-wire and pre-pipe counter with U.L. components per Article 2.6 Fabricated Equipment and Fixtures this Section.

C Ancillary Equipment:

- 01 Two (2) Component Hardware, model K50-X125 base with KL50-X122 adapter, deck mount, base outlet.

D Special instructions:

- 01 Install base outlet behind coffee maker and iced tea brewer.
- 02 Brace top to support counter mounted equipment.
- 03 Coordinate toe base with location of beverage lines.

ITEM NO. 02CL COFFEE MAKER

- A One (1) - By Owner.

ITEM NO. 03CL CUP DISPENSER

- A Five (5) - Dispense-Rite, model CTC-R-4SS.

B To Include:

- 01 Stainless steel finish.
- 02 Counter mount.

C Special Instructions:

- 01 Verify Owner's cup size(s).
- 02 Adjust cup dispensers to accommodate Owner's cups.
- 03 Install on Item No. 01CL, Beverage Counter.

ITEM NO. 04CL LID & CONDIMENT TRAY

- A One (1) - Dispense-Rite, model WLO-1B.

B To Include:

- 01 Counter mount.
- 02 Removable dividers.

C Special Instructions:

- 01 Install on Item No. 01CL, Beverage Counter.

ITEM NO. 05CL CONDIMENT DISPENSER

- A One (1) - By Owner.

ITEM NO. 06CL ICED TEA BREWER

- A One (1) - By Owner.

ITEM NO. 07CL ICE & CARBONATED BEVERAGE DISPENSER

- A Two (2) - By Owner.

ITEM NO. 08CL CARBONATOR

A Two (2) - By Owner.

UPPER LEVEL COMPLIMENTARY BEVERAGE STATION

ITEM NO. 01CU BEVERAGE COUNTER

A One (1) - Fabricated, configuration per drawings and details.

B To Include:

- 01 Work surface 34" AFF.
- 02 Engineered stone top and splash constructed per details. Stone selected, by Architect, from manufacture's standard colors.
- 03 Splash where adjacent to walls.
- 04 Cut and polish hole(s) in top for carbonated beverage lines. Coordinate size/location with Ice & Carbonated Beverage Dispenser. Polish hole(s) in top for extending beverage lines, cord and plug to services below top. Coordinate size/location with Ice & Carbonated Beverage Dispenser.
- 05 Cut and polish hole(s) in top for trash chute to receptacle below. Coordinate hole location with trash chute and trash receptacle.
- 06 Cut and polish hole(s) in top for Base Outlet.
- 07 Closed body base with plastic laminate covered front, per details. Plastic laminate selected, by Architect, from manufacture's standard colors. Stainless steel ends.
- 08 Trash receptacle space. Receptacle shelf enclosed with hinged door.
- 09 Carbonator storage compartment. 14 ga. stainless steel pan per details. Removable pan recessed into toe base, per details and drawings. Storage compartment enclosed with hinged door.
- 10 Intermediate and bottom shelves enclosed with hinged doors per details and drawings.
- 11 Bottom shelf enclosed with hinged doors.
- 12 Plastic laminate doors per details. Each door with lock, keyed alike.
- 13 Utility compartment located per drawings.
- 14 Pre-pipe brass gate valve, below top, to each base outlet.
- 15 Pre-pipe Base Outlets to a common connection point in utility compartment.
- 16 Extend drain lines to utility compartment and terminate at opening above floor drain.
- 17 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Carbonator.
- 18 120V-1ph, 20A receptacle in base with stainless steel cover for connecting Ice & Carbonated Beverage Dispenser.
- 19 14 ga. stainless steel, channel shaped, toe base per details. Set base in continuous bead of clear silicone sealant at floor. Notch base at floor drain and seal base to floor. Floor drain must be accessible when panel is removed.
- 20 Pre-wire and pre-pipe counter with U.L. components per Article 2.6 Fabricated Equipment and Fixtures this Section.

C Ancillary Equipment:

- 01 Tomlinson Industries model 1920107, 9" diameter stainless steel chute. Modify length of chute to be 3 1/4" O.A.
- 02 Two (2) Component Hardware, model K50-X125 base with KL50-X122 adapter, deck mount, base outlet.
- 03 Rubbermaid, model FG294700, gray, trash receptacle.

D Special instructions:

- 01 Install base outlet behind coffee maker and iced tea brewer.
- 02 Brace top to support counter mounted equipment.

03 Coordinate toe base with location of beverage lines.

ITEM NO. 02CU COFFEE MAKER

A One (1) - By Owner.

ITEM NO. 03CU CUP DISPENSER

A Two (2) - Dispense-Rite, model CTC-R-4SS.

B To Include:

01 Stainless steel finish.

02 Counter mount.

C Special Instructions:

01 Verify Owner's cup size(s).

02 Adjust cup dispensers to accommodate Owner's cups.

03 Install on Item No. 01CU, Beverage Counter.

ITEM NO. 04CU LID & CONDIMENT TRAY

A One (1) - Dispense-Rite, model WLO-1B.

B To Include:

01 Counter mount.

02 Removable dividers.

C Special Instructions:

01 Install on Item No. 01CU, Beverage Counter.

ITEM NO. 05CU CONDIMENT DISPENSER

A One (1) - By Owner.

ITEM NO. 06CU ICED TEA BREWER

A One (1) - By Owner.

ITEM NO. 07CU ICE & CARBONATED BEVERAGE DISPENSER

A One (1) - By Owner.

ITEM NO. 08CU CARBONATOR

A One (1) - By Owner.

2.16 ALTERNATE EQUIPMENT MANUFACTURERS

- A. The following list of manufacturers are approved as alternates to equipment items specified. Alternate or Substituted equipment must comply with Article 1.6 Substitutions in this Section.

EMPLOYEE DINING ROOM

ITEM NO. 01ED WALK-IN COOLER / FREEZER

A. Bally

ITEM NO. 02ED WALK-IN SHELVING

A. InterMetro Industries Corp.

ITEM NO. 03ED STORAGE SHELVING

A. InterMetro Industries Corp.

ITEM NO. 06ED MOBILE REFRIGERATED MAKE TABLE

A. Traulsen

ITEM NO. 07ED FREEZER

A. Traulsen

ITEM NO. 09ED COMBI OVEN

A. Alto-Shaam

ITEM NO. 11ED MOBILE FRYER BANK

A. Frymaster

ITEM NO. 12ED WALL MOUNTED SALAMANDER BROILER

A. Jade Range

ITEM NO. 14ED MOBILE GRIDDLE

A. Lang Manufacturing

ITEM NO. 15ED MOBILE CHAR-BROILER

A. Bakers Pride (Dante Series)

ITEM NO. 16ED MOBILE RANGE

A. Jade Range

ITEM NO. 17ED MOBILE HOT FOOD CABINET

A. Carter Hoffmann

ITEM NO. 21ED MOBILE SERVING LINE

A. Eagle Group

ITEM NO. 28ED UNDERCOUNTER REFRIGERATOR

A. Traulsen

ITEM NO. 30ED MOBILE DRAWER WARMER

A. Wells Bloomfield

ITEM NO. 37ED MOBILE REFRIGERATED MAKE TABLE

A. Traulsen

ITEM NO. 38ED PASS-THRU REFRIGERATOR

A. Traulsen

ITEM NO. 39ED STORAGE SHELVING

A. InterMetro Industries Corp.

ITEM NO. 40ED MOVABLE HOT WELL

A. Hatco

ITEM NO. 44ED STORAGE SHELVING

A. InterMetro Industries Corp.

ITEM NO. 45ED ICE MAKER

A. Ice-O-Matic

ITEM NO. 47ED DISHWASHER W/ BOOSTER HEATER

A. Hobart

ITEM NO. 51ED MOBILE PAN RACK

A. Market Forge

ITEM NO. 53ED JANITOR'S CABINET

A. Advance Tabco

ITEM NO. 55ED MOBILE DUMP STATION

A. Custom Fabrication

STANDING BAR

ITEM NO. 01SB WALK-IN KEG COOLER

A. Bally

ITEM NO. 02SB WALK-IN SHELVING

A. InterMetro Industries Corp.

ITEM NO. 03SB KEG RACK

A. Channel Manufacturing

ITEM NO. 04SB STORAGE SHELVING

A. InterMetro Industries Corp.

ITEM NO. 08SB BACK-BAR REFRIGERTOR

A. Perlick Corporation

ITEM NO. 11SB MUG CHILLER

A. Perlick Corporation

ITEM NO. 14SB BAR STATION

A. Perlick Corporation

ITEM NO. 16SB GLASSWASHER

A. Moyer Diebel

ITEM NO. 17SB BAR STATION

A. Perlick Corporation

ITEM NO. 18SB BAR STATION

A. Perlick Corporation

ITEM NO. 19SB BAR STATION

A. Perlick Corporation

ITEM NO. 21SB PASS-UNDER GLASSWASHER

A. Moyer Diebel

CASINO BAR

ITEM NO. 02CB PASS-THRU BACK BAR REFRIGERATOR

A. Perlick Corporation

ITEM NO. 07CB BAR STATION

A. Perlick Corporation

ITEM NO. 09CB GLASSWASHER

A. Moyer Diebel

ITEM NO. 11CB BAR STATION

A. Perlick Corporation

ITEM NO. 12CB BAR STATION

A. Perlick Corporation

ITEM NO. 13CB BAR STATION

A. Perlick Corporation

ITEM NO. 14CB UNDERBAR REFRIGERATOR

A. Perlick Corporation

ITEM NO. 15CB DRAINBOARD

A. Perlick Corporation

ITEM NO. 16CB UNDERBAR REFRIGERATOR

A. Perlick Corporation

ITEM NO. 17CB UNDERBAR REFRIGERATOR

A. Perlick Corporation

BIB STATION

ITEM NO. 01BB ICE MAKER

A. Ice-O-Matic

EVENT CATERING

ITEM NO. 01EC ICE MAKER

A. Ice-O-Matic

ITEM NO. 02EC REFRIGERATOR

A. Traulsen

ITEM NO. 04EC MOBILE GLASS RACK

A. Carlisle

CONCESSION STAND

ITEM NO. 02CS DRAWER WARMER

A. Wells Bloomfield

ITEM NO. 03CS REFRIGERATED MERCHANDISER

A. True Food Service Equipment

ITEM NO. 06CS MOBILE HEATED CABINET

A. Carter Hoffmann

ITEM NO. 07CS ICE MAKER

A. Ice-O-Matic

ITEM NO. 08CS BAR STATION

A. Perlick Corporation

ITEM NO. 14CS BAR STATION

A. Perlick Corporation

ITEM NO. 15CS BAR STATION

A. Perlick Corporation

PART 3 - EXECUTION

3.1 DELIVERY AND INSTALLATION

- A. Supervision:
 - 01 Provide a competent foreman or supervisor who shall remain on the job during all phases of installation.
 - 02 Foreman shall have the technical expertise to oversee erection of equipment and coordinate with other trades regarding connections, installation and inspections.

- B. Delivery:
 - 01 Coordinate with progress of construction and schedule of Owner's operation. The following procedures apply unless instructed and documented by Owner or General Contractor.
 - 02 Foodservice Equipment:
 - a Delivered in factory fabricated containers designed to protect equipment and finish until final installation.
 - 03 Field-Assembled Fixed Equipment:
 - a Delivered to the job-site when directed by the General Contractor and installed/protected accordingly.
 - 04 Fixed Equipment:
 - a Delivered after completion of work on finished ceilings, lighting, finished floor and wall systems, including painting.
 - 05 Movable Equipment:
 - a Delivered to inventory in secured area for job-site storage or when fixed equipment installation and clean-up has been completed.
 - 06 Minor appliances and loose items delivered only when Owner is prepared to receive and inventory such items.

- C. Installation:
 - 01 Performed by technicians skilled in field welding, finishing and adjustment of equipment to fit field conditions in accordance with best standards of the industry.
 - 02 Assemble, square, level and make ready for final utilities connections.
 - 03 Provide sanitary conditions when cutting around obstructions.
 - 04 Sealants:
 - a Apply General Electric construction sealant Series SE-1200 silicone mastic (clear color).
 - b Insert backer rod at 1/8" gaps or as required.
 - c Mask both sides of gap before applying sealant and remove excess for a neat application.
 - d Smoothly apply sealant at all equipment splashes adjacent to walls and other equipment.
 - 05 Trim:
 - a When gaps exceed 1/4", install 18 gauge stainless steel trim molding of proper shape with concealed attachment.
 - b Use epoxy cement or "zee" clips to secure stainless steel trim.
 - c Radius exposed corners and smooth edges of trim.
 - d Reduce gaps to a minimum and seal.

- 06 Anchoring:
 - a Comply with NSF and local health department requirements when anchoring equipment to floor.
 - b All anchoring methods must allow easy cleaning of equipment.
 - c Install stainless steel acorn head nuts on exposed bolt threads.
 - d Provide stainless steel bolts or screws with pan shaped heads.

- D. Protection of Work:
 - 01 Fabricated Fixtures:
 - a Adhere fiberboard or twin wall corrugated board to tops and exposed body panels/components.
 - 02 Manufactured Equipment:
 - a Adhere fiberboard or twin wall corrugated board to equipment as required by shape and installation requirements.
 - 03 Unauthorized Use Of Equipment:
 - a Using equipment for tool and materials storage, workbench, scaffold or stacking area.
 - 04 Damaged Equipment:
 - a Document and submit to Owner a recommendation of action for repair or replacement.
 - b Detail impact on Project Schedule and any changes to the Contract Amount.

3.2 CLEAN AND ADJUST

- A. Clean / Restore Finishes:
 - 01 Clean up and remove all debris from the job site, resulting from work as installation progresses.
 - 02 After completion of installation, and other major work in Foodservice Areas, remove protective coverings and thoroughly clean (interior/exterior) all Foodservice Equipment.
 - 03 Wash/clean equipment and leave in a condition ready for Owners use and sanitation.
 - 04 Restore exposed finishes, remove abrasions and polish exposed metal surfaces.
 - 05 Touch-up damage to painted finishes.
 - 06 Clean and polish (interior/exterior) all Foodservice Equipment ready for use prior to demonstration and final observation.

- B. Adjustment:
 - 01 Lubricate and adjust drawer slides, hinges, casters.
 - 02 Clean or replace faucet aerators and line strainers.
 - 03 Adjust pressure regulating valves, timed-delay relays, thermostatic controls, temperature sensors and ventilator grilles.
 - 04 Start up, adjust and check operation of all Foodservice Equipment prior to demonstration and final observation.
 - 05 Start up and check operation of all refrigeration systems for at least 72 hours prior to acceptance.

3.3 EQUIPMENT START-UP/DEMONSTRATION

- A. Start-Up:
 - 01 Test, adjust and regulate equipment in accordance with the manufacturer's instructions.
 - 02 Provide Authorized Service Agent start-up for equipment when available.
 - 03 Certify in writing to the Owner that the installation, adjustments and performance are in compliance with manufacturer's recommendations.

- B. Demonstration:
 - 01 Provide Owner or Foodservice Operators with a thorough operational demonstration of all equipment.
 - 02 Provide detailed instruction in the care and maintenance of equipment.
 - 03 Coordinate the scheduling of selected equipment items with attendees and Owner at least two weeks in advance of demonstration periods.

3.4 OPERATION AND MAINTENANCE MANUAL

- A. Submission:
 - 01 Submit three (3) sets bound in hardback, three-ring binders (quantity per Contract Documents) at completion of installation.
- B. Format:
 - 01 Cover:
 - a Label cover with manual title and project name.
 - 02 Table of Contents:
 - a Provide Table of Contents listing equipment item number, equipment description and manufacture.
 - b Equipment not requiring operating, parts or maintenance manuals need not be included.
 - 03 Tab Divider:
 - a Provide a tab divider for each manufacture of equipment provided on this project.
 - b Divider to include manufacture's name, operation, maintenance and parts manuals for all equipment of same manufacture.
 - c Place equipment item number, as indicated in the contract documents, on corresponding equipment manuals.
 - 04 Service Directories:
 - a Manual to include a list of equipment and its respective local service agent.
 - b Service agent must be located within 50 miles of project site.
 - c Provide address, telephone number, E-mail address, web site address and name of person to contact.
 - d Service agencies selected shall be factory-authorized for equipment assigned.
 - 05 Required Information:
 - a Manual to include equipment manufacturer's operating/maintenance instructions, replacement parts data and price lists.
 - b Include assemblies and components built into other equipment.
 - c Provide name and address of each respective manufacturer to be contacted for spare or replacement parts after Warranty period.
 - d Provide video tapes and/or CD's for maintenance, training, operation, etc, where available from the manufacturer.

3.5 FINAL OBSERVATION

- A. Final observation will be made when the Contractor has certified that he has completed his work, reviewed the installation/ operation of each item and found it to be in compliance with the Construction Documents.

- B. Repetitive final observations incurred due to the Contractor's failure to comply with requirements of this Article may be invoiced to this Contractor at Consultant's standard hourly rates.

END OF SECTION

SECTION 123613

PRECAST CONCRETE COUNTERTOPS

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. Templating, fabrication and installation of precast concrete countertops.

1.3 ACTION SUBMITTALS:

- A. Product Data: For countertop materials and sinks.
- B. Submittals:
 - 1. Shop Drawings: Indicate profiles of members, jointing, fastening, cut-outs for mechanical services, sinks, accessories, backsplashes, thickness, and related items.
 - 2. Samples: Submit following:
 - a. 3 inch by 3 inch samples of concrete with appropriate finish and color for acceptance before proceeding with Work. Indicate maximum range of variation.

1.4 QUALITY ASSURANCE:

- A. Regulatory Requirements: Conform to ANSI A117.1 or local code if more stringent requirements are applicable for installing work for accessibility to handicapped.
- B. Manufacturer Qualifications: Company specializing in fabricating work specified in this Section with minimum four years experience in type work required for Project.
- C. Concrete fully engineered to comply with appropriate ACI 318 guidelines.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. If units are shipped via commercial freight, open crates and inspect each slab in the presence of the driver. Note any and all damage, and do not accept shipment if damage is present. Claims due to shipping damage must be submitted to the freight carrier.

- B. Handle, transport and store units to prevent damage to materials or structure. Handle with care to prevent damage to corners and edges.

1.6 SITE CONDITIONS:

- A. Templating:
 - 1. All cabinets, millwork or other supporting structures must be fully installed prior to templating, unless otherwise arranged with manufacturer.
 - 2. All cabinets, millwork or other supporting structures must be free of debris or obstructions.
 - 3. All fixtures that penetrate the concrete, such as sinks, faucets, drop-in cook tops, soap dispensers, etc., must be on site at the time of templating.
 - 4. Electricity must be available on site, with outlets or extension cords, and running water must be available in proximity of area to be templated.

1.7 INSTALLATION:

- A. Installer's vehicle must be able to park within 10 yards of installation area's key point of entry.
- B. Pathway to installation area must be free of debris or obstructions and accessible to two to three personnel carrying slabs weighing up to 350 pounds and up to eight feet in length.
- C. All cabinets, millwork or other supporting structures must be free of debris or obstructions.

1.8 SEQUENCING:

- A. Templating:
 - 1. All cabinets, millwork or other supporting structures must be fully installed prior to templating, unless otherwise arranged with manufacturer.
 - 2. All fixtures that penetrate the concrete, such as sinks, faucets, drop-in cook tops, soap dispensers, etc., must be on site at the time of templating.

1.9 INSTALLATION:

- A. All support brackets, hard point connections, etc., must be on site at the time of installation. Manufacturer does not supply these items.
- B. Electrical and plumbing hookup should be scheduled after installation is completed. Manufacturer does not perform electrical and plumbing hookup.

1.10 WARRANTY :

- A. Manufacturer shall offer a one-year structural warranty as follows: During the first year after installation, manufacturer, at its sole option, shall repair or replace product if it fails to maintain functional structural integrity for the intended purpose of the product solely due to a manufacturing defect. This applies only to products that have been handled, fabricated, installed and maintained in the manner recommended by the manufacturer. Hairline cracks, surface scratches and chips are not included as part of this warranty, nor is structural damage caused by severe impacts, physical overloading or damage stemming from loss of support and/or excessive deflections by the supporting cabinetry or hardware. Individual slabs are designed to safely support a maximum 300 lb. point load centered on the slab.

- B. Manufacturer shall offer a one-year coating/sealer warranty as follows: During the first year after installation, manufacturer, at its sole option, shall repair or replace sealer if it fails to maintain functional integrity for the intended purpose of the product solely due to a manufacturing defect.
 - 1. General food preparation will not stain the concrete providing spills are wiped up promptly. This warranty does not cover damage to the sealer resulting from impacts, cuts, scrapes or damage by harsh chemicals or intense heat. Prolonged exposure to acids and acidic food items may cause etching. Spills should be removed as soon as possible. Provide sealer that is resistant to hot objects up to 450 degrees Fahrenheit. Objects placed on the sealer above 450 degrees Fahrenheit will void warranty. Cutting directly on the countertop or exposure to open flame voids the warranty.

1.11 MAINTENANCE:

- A. Variations in texture, dimension, color and aggregate distribution and exposure within a final product are an inherent property of concrete countertops. Hairline cracks that may occur in the finished product are a natural characteristic of concrete. Minor non-structural hairline cracks or crazing may result from shrinkage or substrate movement and shall not be considered a manufacturing defect. All units are sealed to resist moisture and staining. As with natural materials, samples of any material may not accurately represent installed material. All sizes are nominal and slight variations in thickness are to be expected.

- B. Provide manufacturer’s printed instructions for care and maintenance of precast concrete countertop units.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. DEX Industries, Atlanta, GA, (404) 753-0600.

2.2 MATERIALS:

A. Precast Concrete Countertop:

1. All units to be structurally engineered and custom made using a precast, custom-blended, fiberglass reinforced Portland cement based concrete.
2. Density: approx. 140 lbs. per cubic foot. Weight per unit area: 14.5-lbs/sq. ft. for 1.25" thick slabs.
3. Standard Thickness: 1.25" nominal.
4. Standard Edge: Square edge, eased arris and corners.
5. Integral Sinks: Provide integral sinks with depths and dimensions as detailed on drawings.
6. Color: Custom colors as selected by the Architect.
7. Sealer: All units to be factory sealed with a high performance fully penetrating sealer. This sealer shall exhibit the following properties:
 - a. Safe for food contact surfaces.
 - b. Colorless.
 - c. Weather resistant; suitable for interior and exterior use.
 - d. Water and oil repellent.
 - e. Non-yellowing (UV resistant).
 - f. Scratch proof.
 - g. Peel, chip and flake proof.
 - h. Highly heat resistant.
 - i. Stain resistant to food and oil when wiped up immediately.
 - j. Long lasting.
 - k. Environmentally safe.
 - l. Simple and quick reapplication only when necessary.
8. Cracks: Non-structural hairline cracks are possible and may result from shrinkage or substrate movement over time.

B. Joint Sealant:

1. Supplied by manufacturer.
2. Colors: Matched to countertop unless otherwise requested.
3. Acceptable products:
 - a. Accucolor TA-850 sanded, siliconized acrylic caulk by TEC Specialty Products, Inc., Palatine, IL., or equivalent.

C. Adhesive:

1. Countertop: Clear 100% silicone caulk.
 - a. GE Silicone I Kitchen & Bath or equivalent.

2.3 FABRICATION:

- A. All units to be custom made in manufacturer's manufacturing shop.

- B. All units to be structurally reinforced to accommodate appropriate spans, cutouts and cantilevers. Slabs shall be handled and moved while in a vertical orientation, similar to the technique used for handling plate glass.
- C. All units to be fabricated straight, smooth, and true to size and shape prior to finishing. Exposed edges to be finished as per edge specifications. Maximum dimensional variations: +0", - 1/8" at maximum slab length.
- D. All units to be hand finished prior to sealing. Hand finishing includes grinding the surface, filling voids and honeycomb with colored grout, easing all edges (where appropriate), and leveling and polishing.
- E. Units shall be air dried and sealed.

2.4 FINISHES:

- A. All units to be factory sealed with sealer that meets requirements in Article 2.01 (A) 6.

PART 3 - EXECUTION

3.1 TEMPLATING:

- A. Manufacturer performs templating, or, manufacturer provides detailed templating instructions to contractor, and contractor provides templates to manufacturer.

3.2 INSTALLATION:

- A. Manufacturer performs installation, or, manufacturer provides detailed installation instructions to contractor, and contractor performs installation.
- B. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

3.3 CLEANING

- A. General:
 - 1. Keep installed work clean as work progresses.
 - 2. Wipe up spills as soon as possible. Clean using damp cloth or sponge and mild, non-surfactant, neutral pH detergent or other water-based cleansers. Do not use harsh chemicals, abrasive cleansers or abrasive scrubbers. Use precast concrete countertop manufacturer's recommended cleaner.

END OF SECTION 123613

PART 1 - GENERAL1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Section includes stone countertops.
- B. Related Sections include the following:
 - 1. Section 090001 "Schedule of Finishes."

1.3 SUBMITTALS:

- A. Product Data: For the following:
 - 1. Each variety of stone.
 - 2. Stone accessories and other manufactured products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
 - 1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples for Verification:
 - 1. For each stone type indicated, in sets of Samples not less than 12 inches square. Include two or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work.
 - 2. Provide 8" x 12" sample mockup of countertop edge detail.
- D. Qualification Data: For Installer, fabricator.
- E. Maintenance Data: For stone countertop to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.4 QUALITY ASSURANCE:

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate stone countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

- B. Installer Qualifications: Fabricator of stone countertops.
- C. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.
 - 1. Obtain each variety of stone from a single quarry, whether specified in this Section or in another Section of the Specifications.
- D. Source Limitations for Other Materials: Obtain each type of stone accessory, sealant, and other material from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
- B. Store stone on wood A-frames or pallets with nonstaining separators and nonstaining, waterproof covers. Ventilate under covers to prevent condensation.
- C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.6 PROJECT CONDITIONS:

- A. Do not set stone when air or material temperature is below 50 deg F.
- B. Maintain minimum ambient temperature of 50 deg F during installation and for 7 days after completion unless higher temperatures are required by fabricator's or supplier's instructions.
- C. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating countertops without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 STONE TYPES [STN-(#)]:

- A. Granite: Comply with ASTM C 615.
 - 1. Varieties and Sources: Subject to compliance with requirements, provide stone of varieties and from sources complying with the Stone Schedule in Section 090001 "Schedule of Finishes."
 - 2. Finish: Polished.

3. Thickness: 3/4" (2cm).
4. Countertop Edge: Match profiles indicated on Drawings.

2.2 ADHESIVES AND SEALANTS:

- A. General: Use only adhesives formulated for stone and ceramic tile and recommended by their manufacturer for the application indicated.
- B. Adhesives and sealants shall meet the Food and Drug Administration (FDA) regulations permitting use in food contact applications. When properly cured, these products must comply with the FDA regulations of Title 21 Code of Federal Regulations under Sections 175.105 and 175.300.
- C. Stone Seam Adhesive: 2-part, epoxy or polyester adhesive with an initial set time of not more than 2 hours at 70 deg F, and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 1. Color: Match stone.
 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Epoxy Adhesive: Epoxies Etc.; series 20-3062 LV.
- D. Joint Sealant:
 1. Clear sealant of type recommended by manufacturer for application and use.
 2. Provide anti-bacterial type in toilet, bath, food preparation, and high humidity.
 3. Acceptable manufacturers:
 - a. Dow Corning.
 - b. GE Sealants.
 - c. Pecora Corporation.
 4. Solvent: Denatured alcohol for cleaning granite surfacing to assure adhesion of adhesives and sealants.

2.3 STONE ACCESSORIES:

- A. Setting Shims: Resilient plastic shims, nonstaining to stone, sized to suit joint thicknesses.
- B. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.

2.4 STONE FABRICATION, GENERAL:

- A. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 - 1. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
- B. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
 - 1. Clean sawed backs of stones to remove rust stains and iron particles.
 - 2. Dress joints straight and at right angle to face, unless otherwise indicated.
 - 3. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
- C. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each type of stone required and to match approved samples and mockups.
- D. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
 - 1. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved samples.

2.5 STONE COUNTERTOPS:

- A. General: Comply with recommendations in MIA's "Dimensional Stone--Design Manual IV."
- B. Nominal Thickness: Provide thickness indicated, but not less than 3/4 inch. Gage backs to provide units of identical thickness.
- C. Edge Detail: As indicated on Drawings.
 - 1. Laminations: Laminate layers of granite surfacing as required to create built up edges following procedures recommended by the manufacturer.
- D. Seams: Fabricate countertops in sections indicated for joining in field, with seams as follows:
 - 1. Bonded Joints: 1/32 inch (0.8 mm) or less in width.
 - 2. Sealant-Filled Joints: 1/16 inch (1.5 mm) in width.
- E. Cutouts and Holes for Lavatories, Sinks, and Fittings:
 - 1. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 2. Fittings: Drill countertops in shop for plumbing fittings, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine surfaces indicated to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring and supporting stone countertop. Furnish installers of other work with Drawings or templates showing locations of these items.
- B. Before installing stone countertops, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES:

- A. Variation from Plumb: For vertical lines and surfaces, do not exceed 1/8 inch in 96 inches or 1/4 inch maximum.
- B. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
- C. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed 1/8 inch in 96 inches, 1/4 inch in 20 feet, or 3/8 inch maximum.
- D. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus 1/8 inch.
- E. Variation in Joint Width: Do not vary joint thickness more than 1/16 inch or 1/4 of nominal joint width, whichever is less.
- F. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed 1/32-inch difference between planes of adjacent units.

3.4 INSTALLATION OF COUNTERTOPS:

- A. General: Install countertops by adhering to supports with water-cleanable epoxy adhesive.

- B. Bond seams with stone seam adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to seams to prevent adhesive smears. Clamp units to temporary bracing to ensure that countertops are properly aligned and seams are minimum width.
- C. Space seams with 1/16-inch gap for filling with sealant. Use temporary shims to ensure uniform spacing and clamp units to temporary bracing to eliminate lipping.
- D. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting.
- E. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive and to countertops with stone seam adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Joints:
 - 1. Joints Between Adjacent Pieces of Granite Surfacing:
 - a. Joints shall be flush, tight fitting, level and neat.
 - b. Securely join adjacent pieces with epoxy adhesive.
 - c. Fill joints level to polished surface.
 - d. Secure adjacent granite surfaces with vacuum clamps until adhesive hardens.
 - 2. Joints Between Granite Surface and back splash: Seal joints with '50' year silicone sealant.

3.5 ADJUSTING AND CLEANING:

- A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Remove and replace stone countertops of the following description:
 - 1. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by Architect.
 - 2. Defective countertops.
 - 3. Defective joints, including misaligned joints.
 - 4. stone countertops and joints not matching approved Samples and mockups.
 - 5. stone countertops not complying with other requirements indicated.
- C. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.
- D. Clean stone countertops no fewer than three days after completion of installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.

3.6 PROTECTION:

- A. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
- B. Before inspection for Substantial Completion, remove protective coverings and clean surfaces.

END OF SECTION 123640

SECTION 123661

SOLID SURFACING COUNTERTOPS

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. Solid-surface-material countertops and backsplashes.
- B. Related Sections:
 - 1. Section 224100 "Plumbing Fixtures" for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS:

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples for Initial Selection: For each type of material exposed to view.
- D. Samples for Verification: For the following products:
 - 1. Countertop material, 6 inches (150 mm) square.

1.4 PROJECT CONDITIONS:

- A. Field Measurements: Verify dimensions of countertops by field measurements before countertop fabrication is complete.

1.5 COORDINATION:

- A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS:

- A. Configuration: Provide countertops with the following front and backsplash style:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. Endsplash: Matching backsplash.
- B. Countertops: 3/4-inch- (19.0-mm-) thick, solid surface material.
- C. Backsplashes: 3/4-inch- (19.0-mm-) thick, solid surface material.
- D. Fabrication: Fabricate tops in one piece with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate with loose backsplashes for field assembly.

2.2 COUNTERTOP MATERIALS:

- A. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide named product or Architect approved equivalent product by one of the following:
 - a. Avonite Surfaces.
 - b. Formica Corporation.
 - c. Wilsonart International.
 - 2. Type: Provide Standard Type.
 - 3. Colors and Patterns:
 - a. SS-[#]: See Section 090001 "Schedule of Finishes."

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet (3 mm in 2.4 m).

- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Pre-drill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 1. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

END OF SECTION 123661

SECTION 124813

ENTRANCE FLOOR MATS 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:
 - 1. Resilient-tile entrance mats.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for floor mats.
- B. Shop Drawings:
 - 1. Perimeter floor moldings.
- C. Samples: For the following products, in manufacturer's standard sizes:
 - 1. Floor Mat Tile.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor mats to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Resilient-Tile Entrance Mats: Full-size tile units equal to 2 percent of amount installed, but no fewer than 5 units.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS , GENERAL

- A. Regulatory Requirements: Comply with applicable provisions in 2010 ADA Standards in Accessible Design and ICC A117.1.

2.2 RESILIENT-TILE ENTRANCE MATS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Supreme Nop 52 Tile; Mats Inc., or a comparable product by one of the following:
 - 1. American Floor Products Company, Inc.
 - 2. American Mat & Rubber Company.
 - 3. Cactus Mat Mfg. Co.
 - 4. Consolidated Plastics Company, Inc.
 - 5. Durable Corporation.
 - 6. Flexco.
 - 7. Musson Rubber Company.
 - 8. Pawling Corporation; Architectural Products Division.
 - 9. Tennessee Mat Company, Inc.
 - 10. Turtle Plastics.

- B. Carpet-Type Tiles: Polypropylene carpet bonded to 1/8- to 1/4-inch- (3.2- to 6.4-mm-) thick, flexible vinyl backing to form mats 3/8 or 7/16 inch (9.5 or 11 mm) thick with nonraveling edges.
 - 1. Colors, Textures, and Patterns (**WM-1**): As selected by Architect.
 - 2. Tile Size: 19-11/16 by 19-11/16 inches (50 cm by 50 cm).
 - 3. Pile Weight 52 oz/sq yd.
 - 4. Tile Weight 141 oz/sq yd.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats .
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

END OF SECTION 124813

SECTION 142400

HYDRAULIC ELEVATORS

PART 1 - GENERAL1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes hydraulic passenger and service elevator.
- B. Related Requirements:
1. Section 015000 "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
 2. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 3. Section 042000 "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
 4. Section 051200 "Structural Steel Framing" for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
 - d. Structural-steel shapes for subsills that are part of steel frame.
 5. Section 055000 "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
 - d. Structural-steel shapes for subsills.
 - e. Pit ladders.
 - f. Cants in hoistways made from steel sheet.
 6. Section 055213 "Pipe and Tube Railings" for railings between adjacent elevator pits.
 7. Section 221429 "Sump Pumps" for sump pumps, sumps, and sump covers in elevator pits.
 8. Section 271500 "Communications Horizontal Cabling" for telephone service for elevators.
 9. Section 283111 "Digital, Addressable Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- B. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station and standby power operation control panel.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.
- D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

- D. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner with terms, conditions, and obligations as set forth in, and in same form as, "Draft of Elevator Maintenance Agreement" at end of this Section, starting on date initial maintenance service is concluded.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.9 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Model HydroFit 4500; Otis Elevator Co.**, or comparable product by one of the following:
 - 1. Fujitec America, Inc.
 - 2. KONE Inc.
 - 3. Schindler Elevator Corp
 - 4. ThyssenKrupp Elevator.

- B. Source Limitations: Obtain elevators, including electric traction passenger elevators specified in Section 142100 "Machine-Room-Less Electric Traction Passenger Elevators," from single manufacturer.
 - 1. Major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with 2010 ADA Standards for Accessible Design and ICC/ANSI A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 - 2. Affected peak velocity acceleration (Av): Refer to Structural Drawings.
 - 3. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 4. Provide seismic switch required by ASCE/SEI 7.
 - 5. Design earthquake spectral response acceleration short period (Sds): Refer to Structural Drawings.
 - 6. Project's Seismic Design Category: Refer to Structural Drawings.
 - 7. Elevator Component Importance Factor: 1.0.

2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
 - 1. Elevator Number: 1.
 - 2. Type: Holeless, beside-the-car, dual cylinder.
 - 3. Rated Load: 4500 lb (2041 kg).
 - 4. Rated Speed: 125 fpm (0.635 m/s).
 - 5. Operation System: Single automatic.
 - 6. Auxiliary Operations:
 - a. Standby power operation.
 - 7. Car Enclosures:
 - a. Inside Width: 5'-5-9/16" from side wall to side wall.
 - b. Inside Depth: 7'-11-1/2" from back wall to front wall (return panels).
 - c. Inside Height: 93 inches (2362 mm) to underside of ceiling.
 - d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
 - e. Car Fixtures: Satin stainless steel, No. 4 finish.
 - f. Side and Rear Wall Panels: Plastic laminate.

- g. Door Faces (Interior): Satin stainless steel, No. 4 finish.
 - h. Reveals: Aluminum.
 - i. Door Sills: Nickel silver.
 - j. Ceiling: Luminous ceiling, LED lighting.
 - k. Handrails: 1-1/2 inches (38 mm) round satin stainless steel, No. 4 finish, at left side of car.
 - l. Floor: Refer to Room Finish Schedule.
8. Hoistway Entrances:
- a. Width: 48 inches (1219 mm).
 - b. Height: 84 inches (2134 mm).
 - c. Type: Single-speed side sliding.
 - d. Frames: Satin stainless steel, No. 4 finish.
 - e. Doors: Satin stainless steel, No. 4 finish.
 - f. Sills: Nickel silver.
9. Hall Fixtures: Satin stainless steel, No. 4 finish.
10. Additional Requirements:
- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
 - b. Provide hooks for protective pads and two complete set(s) of full-height protective pads.

2.4 SYSTEMS AND COMPONENTS

- A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Pump shall be submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts or shall be tank-top-mounted type with fan-cooled, squirrel-cage induction motor, and shall be mounted on oil tank with vibration isolation mounts and enclosed in prime-painted steel enclosure lined with 1-inch-(25-mm-) thick, glass-fiber insulation board.
 - 2. Motor shall have solid-state starting.
- B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.
- C. Piping: Size, type, and weight of piping as recommended by elevator manufacturer, with flexible connectors to minimize sound and vibration transmissions from power unit.
 - 1. Cylinder units shall be connected with dielectric couplings.
 - 2. Casing for Underground Piping: Schedule 40 PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
- D. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

- F. Car Frame and Platform: Welded or bolted steel units.
- G. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
 - 1. Single-Car Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
 - 2. Group Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. Only one car is moved upward at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
 - 3. Independent Service: Keyswitch in car-control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
- C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
 - 1. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car-control stations and hall push-button stations. Key is removable in either position.
 - 2. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes all cars in a group to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.
- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

- A. General: Provide enameled-steel car enclosures to receive removable wall panels, with removable car roof, access doors, power door operators, and ventilation.
 - 1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.
- B. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Subfloor: Exterior, C-C Plugged grade plywood, not less than 7/8-inch (22.2-mm) nominal thickness.
 - 2. Floor Finish: Specified in 096813 "Carpet Tile.
 - 3. Side and Rear Wall Panels: Plastic laminate.
 - a. #F12PPS, "Glossy Nickel;" Otis.
 - 4. Fabricate car door frame integrally with front wall of car.
 - 5. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - 6. Sight Guards: Provide sight guards on car doors.
 - 7. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
 - 8. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - 9. Metal Ceiling: Flush panels, with 6 LED (FC6) light fixtures drop ceiling; Otis
 - a. Finish: Black.
 - 10. Handrails: Manufacturer's standard flat handrails, satin stainless steel (DH-155); Otis..

2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
 - 1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 1-1/2 hours.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 - 1. Enameled-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
 - 2. Stainless-Steel Frames: Formed from stainless-steel sheet.
 - 3. Bronze Frames: Formed from cold- or hot-rolled steel sheet, with enamel finish, and with formed-bronze sheet laminated to steel frames using adhesive that fully bonds metal to metal without telegraphing or oil-canning.

4. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches (76 mm) high, on both inside surfaces of hoistway door frames.
5. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
6. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
7. Sight Guards: Provide sight guards on doors matching door edges.
8. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
9. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LEDs.
- B. Swing-Return Car-Control Stations: Provide car-control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.
 1. Mark buttons and switches for function. Use both tactile symbols and Braille.
 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. Firefighters' Two-Way Telephone Communication Service: Provide telephone jack in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Section 283111 "Digital, Addressable Fire-Alarm System."
- E. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- F. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 1. Provide manufacturer's standard wall-mounted units.
 2. Equip units with buttons for calling elevator and for indicating applicable direction of travel.
- G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:
 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
- H. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 1. At manufacturer's option, audible signals may be placed on cars.

- I. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1/CSA B44, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed.
- J. Fire-Command-Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1/CSA B44, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.
- K. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- D. Stainless-Steel Bars: ASTM A 276, Type 304.
- E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.

- B. **Welded Construction:** Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS workmanship and welding operator qualification standards.
- C. **Sound Isolation:** Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Install piping above the floor, where possible. Install underground piping in casing.
- E. Lubricate operating parts of systems as recommended by manufacturers.
- F. **Alignment:** Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- G. **Leveling Tolerance:** 1/4 inch (6 mm), up or down, regardless of load and travel direction.
- H. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- I. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.
 - 3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

3.3 FIELD QUALITY CONTROL

- A. **Acceptance Testing:** On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. **Temporary Use:** Limit temporary use for construction purposes to one elevator. Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 1. Perform maintenance during normal working hours.
 2. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

END OF SECTION 142400

SECTION 144200

WHEELCHAIR LIFTS

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. Vertical platform lift.
- B. Related Sections include the following:
 - 1. Division 26 ELECTRICAL Sections for electrical service to wheelchair lift and inclined platform lifts.

1.3 ACTION SUBMITTALS:

- A. Product Data: For each type of product.
- B. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS:

- A. Product certificates.
- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS:

- A. Operation and maintenance data.
- B. Inspection and acceptance certificates and operating permits.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 WARRANTY:

- A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 VERTICAL PLATFORM LIFT:

- A. Vertical Platform Lift, General: Preengineered lift system.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Full Cab Vertical Wheelchair Lift; Garaventa Lift**, or a comparable product by one of the following:
 - a. Bruno Independent Living Aids, Inc.
 - b. Butler Dynamics, LLC.
 - c. Florlift of New Jersey, Inc.
 - d. Giant Lift Equipment Mfg. Co., Inc.
 - e. Inclinator Company of America.
 - f. Liftavator, Inc.
 - g. National Wheel-O-Vator Co., Inc.
 - h. Savaria Concord Lifts.
- B. Platform Size: 36 inches (914 mm) by 60 inches (1524 mm).
- C. Rated Load: 750 lbs.
- D. Number of Stops: 2.
- E. Car Configuration:
 - 1. Style 2: Straight through entry/exit.

F. Landing Openings:

1. All Landings: Fire Doors interlocked with Lift controls.
2. Door Construction:
 - a. Fire Rated Doors: 1-1/2 hour B label rating. Pre-hung, constructed of 16 gauge (1.5 mm) steel, with a vision panel, delayed action door closer, pull handle and integrated interlock. Doors mount flush to the inside wall of the shaftway.
 - b. Nominal Door Width: 36 inches.
 - c. Power Door Operator: Automatically opens the door/gate when platform arrives at a landing. Will also open at landing by pressing call button.
 - d. ADA Compliant and obstruction sensitive.
 - e. Provide power operators at the following locations:
 - 1) Lowest Landing: Door.
 - 2) Second Landing: Door.

G. Shaftway Pit at Lower Landing:

1. Pit Mount: Lift to be mounted in pit with dimensions to meet manufacturer requirements for the car size specified.

H. Hydraulic Drive:

1. Drive Type: 1:2 Cable hydraulic.
2. Emergency Operation: Manual device to lower platform.
3. Safety Devices:
 - a. Slack chain safety device
 - b. Shoring device.
4. Travel Speed: 30 fpm (.15 m/second).
5. Power Supply: As per Garaventa Lift shop drawings

I. Car Controls: 24 VDC control circuit with the following features.

1. Direction Control: Illuminated constant pressure buttons.
2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
3. Keyless operation.
4. Emergency Telephone: Platform shall be equipped with ADA compliant integrated telephone with a stainless steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 26.

J. Call Station Controls: 24 VDC control circuit with the following features.

1. Direction Control: Illuminated constant pressure buttons.
2. Keyless operation.

3. Call Station Mounting:
 - a. Lowest: Mounted within the door frame.
 - b. Second Floor: Mounted within the door frame.

- K. Safety Devices and Features:
 1. Grounded electrical system with upper, lower, and final limit switches.
 2. At all landings a solenoid activated interlock shall electrically monitor that the door is in the closed position and the lock is engaged before lift can move from landing.
 3. Pit stop switch.
 4. Electrical disconnect shall shut off all power to the lift.
- L. Self-Supporting Unit: Support vertical loads of unit only at base, with lateral support only at landing levels.

2.3 MATERIALS:

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M.
- C. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by loads.
- D. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel (CS) or ASTM A 1011/A 1011M hot-rolled, commercial steel (CS); as required for each use.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) zinc coating.
- F. Galvanizing: Hot-dip galvanize items complying with the following:
 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- G. Expansion Anchors: Anchor-bolt-and-sleeve assembly of material indicated below with capability to sustain a load equal to 10 times the load imposed as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.
 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 2. Material: Group 1, Alloy 304 or Alloy 316, stainless-steel bolts and nuts complying with ASTM F 593 (ASTM F 738M) and ASTM F 594 (ASTM F 836M).

2.4 FINISHES:

- A. Car Walls: ½” (12 mm) Plastic Laminate.
 1. Pattern: As selected by Architect.

- B. Car Operating Panel: Brushed stainless steel.
- C. Car Hand Rail: Brushed stainless steel.
- D. Hall Call Stations: Brushed stainless steel.
- E. Steel and Galvanized-Steel Factory Finish: Manufacturer's standard baked-enamel or powder-coat finish.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.
- F. Steel Finishes:
 - 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 80 inches (2032 mm) above any point on platform floor at any point of travel.
- C. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces.
- D. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- E. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.
- F. Coordinate platform doors with platform travel and positioning.
- G. Adjust stops for accurate stopping at each landing.
- H. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.
- I. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.

3.2 FIELD QUALITY CONTROL:

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.

3.3 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

END OF SECTION 144200

SECTION 144201

PORTABLE WHEELCHAIR LIFTS

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. Portable vertical platform lift.
- B. Related Sections include the following:
 - 1. Division 26 ELECTRICAL Sections for electrical service to wheelchair lift.

1.3 ACTION SUBMITTALS:

- A. Product Data: For each type of product.
- B. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS:

- A. Product certificates.
- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS:

- A. Operation and maintenance data.
- B. Inspection and acceptance certificates and operating permits.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 WARRANTY:

- A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS:

- A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
- B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."

2.2 VERTICAL PLATFORM LIFT:

- A. Vertical Platform Lift, General: Preengineered lift system.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **PORTABLE TRUS-T-LIFT System; Accessibility Professionals.**
- B. Platform Size: 34 inches (914 mm) by 54 inches (1524 mm).
- C. Rated Load: 550 lbs. (250kg).
- D. Car Configuration:
 - 1. Style: Straight through entry/exit.
- E. Drive System:
 - 1. Primary Drive: 1/2 hp motor, 15 full-load amps, continuous duty.
 - 2. Battery backup emergency lowering.
- F. Car Controls:
 - 1. Constant pressure soft touch control pads.
 - 2. Keyed emergency stop and manual operation.

G. Safety Devices and Features:

1. Safety handrail on platform.
2. 18" wide positive action reversible toe plate for universal access.
3. Electrical fused disconnect shall shut off all power to the lift.

H. High grade casters with foot activated locking position to keep lift in place.

2.3 MATERIALS:

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M.
- C. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by loads.
- D. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel (CS) or ASTM A 1011/A 1011M hot-rolled, commercial steel (CS); as required for each use.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 (Z275) zinc coating,
- F. Galvanizing: Hot-dip galvanize items complying with the following:
 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.

2.4 FINISHES:

- A. Finished in durable off-white baked enamel finish.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 80 inches (2032 mm) above any point on platform floor at any point of travel.
- C. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces.
- D. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- E. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.

- F. Coordinate platform doors with platform travel and positioning.
- G. Adjust stops for accurate stopping at each landing.
- H. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.
- I. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.

3.2 FIELD QUALITY CONTROL:

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Re-adjust stops, signal equipment, and other devices for accurate stopping and operation of system.

3.3 DEMONSTRATION:

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

END OF SECTION 144200

SECTION 210500

BASIC FIRE SUPPRESSION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City of Schenectady prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. Building Code of Oklahoma State.
 - 2. Mechanical Code of Oklahoma State.

3. Plumbing Code of Oklahoma State.
4. Fuel Gas Code of Oklahoma State.
5. Fire Code of Oklahoma State.
6. Energy Conservation Construction Code of Oklahoma State.
7. Oklahoma State Department of Labor Rules and Regulations.
8. Oklahoma State Department of Health.
9. National Electrical Code (NEC).
10. Occupational Safety and Health Administration (OSHA).
11. Local Codes and Ordinances.
12. Life Safety Codes, NFPA 101.
13. City of Schenectady Plumbing Department.
14. Oklahoma State Education Department Manual of Planning Standards.
15. ASPE/ANSI 45-2013: Siphonic Roof Drainage.

1.6 GLOSSARY

| | |
|--------|---|
| ACI | American Concrete Institute |
| AGA | American Gas Association |
| AGCA | Associated General Contractors of America, Inc. |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AFBMA | Anti-Friction Bearing Manufacturer's Association |
| AMCA | Air Moving and Conditioning Association, Inc. |
| ANSI | American National Standards Institute |
| ARI | Air Conditioning and Refrigeration Institute |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. |
| ASME | American Society of Mechanical Engineers |
| ASPE | American Society of Plumbing Engineers |
| ASTM | American Society for Testing Materials |
| AWSC | American Welding Society Code |
| AWWA | American Water Works Association |
| FM | Factory Mutual Insurance Company |
| IBR | Institute of Boiler & Radiation Manufacturers |
| IEEE | Institute of Electrical and Electronics Engineers |
| IRI | Industrial Risk Insurers |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturer's Association |
| NESC | National Electrical Safety Code |

| | |
|----------|---|
| NFPA | National Fire Protection Association |
| OK/DEQ | Oklahoma State Department of Environmental Quality |
| SBI | Steel Boiler Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| UFPO | Underground Facilities Protective Organization |
| UL | Underwriter's Laboratories, Inc. |
| OSHA | Occupational Safety and Health Administration |
| XL - GAP | XL Global Asset Protection Services |

1.7 DEFINITIONS

| | |
|---|---|
| Acceptance | Owner acceptance of the project from Contractor upon certification by Owner's Representative. |
| As Specified | Materials, equipment including the execution specified/shown in the contract documents. |
| Basis of Design | Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.) |
| Code Requirements | Minimum requirements. |
| Concealed | Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade. |
| Coordination Drawings | Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended. |
| Delegated-Design Services | (Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations. |
| Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required | Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer. |
| Exposed | Work not identified as concealed. |

| | |
|--------------------------------|---|
| Extract | Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications. |
| Furnish | Purchase and deliver to job site, location as directed by the Owner's Representative. |
| Inspection | Visual observations by Owner's site Representative. |
| Install | Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional. |
| Labeled | Refers to classification by a standards agency. |
| Manufacturers | Refer to the article, Equipment Arrangements, and the article, Substitutions. |
| Prime Professional | Architect or Engineer having a contract directly with the Owner for professional services. |
| Product Data | Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work. |
| Provide (Furnish and Install) | Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated. |
| Relocate | Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use. |
| Remove | Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner. |
| Review and Reviewed | Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. |
| Roughing | Pipe, duct, conduit, equipment layout and installation. |
| Samples | Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged. |
| Satisfactory | As specified in contract documents. |
| Shop Drawings | Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work. |
| Site Representative | Owner's Inspector or "Clerk of Works" at the work site. |
| Submittals Defined (Technical) | Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents. |

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.
- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.
- C. Refer to Section 013300 - Submittal Procedures for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 UTILITY COMPANY SERVICES

- A. Plumbing Contractor shall make arrangements with utility for gas service to the Owner's distribution system. Provide service to the building as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the gas service shall comply with the published Utility Company standards. **PAY ALL UTILITY COMPANY CHARGES; INCLUDE CHARGES IN THE BASE BID.**

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 COORDINATION SHOP DRAWINGS

- A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
1. Siphonic roof drainage is an engineered system, and priority must be given to the location and elevation of all siphonic roof drainage piping.
 2. The HVAC Contractor shall prepare the base plan coordination drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be redrawn.
 3. The HVAC Contractor shall provide reproducibles and/or prints and submit the base plan to all Contractors. Electronic drawing files may be furnished to the contractors which have the CAD capabilities required for their use.
 4. The Plumbing/Fire Protection Contractor shall draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
 5. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
 6. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.

7. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
 8. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.
- B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
 2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment

or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.17 PAINING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Refer to Division 9 - Finishes, for additional information.

1.18 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.19 CHASES

- A. New Construction:
 - 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
 - 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.

3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.20 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.21 NON-RATED WALL PENETRATIONS

- ##### A.
- Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.22 PENETRATION FIRE STOPPING

- A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 ACCESS PANELS

- A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.25 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.26 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Install controls and devices furnished by others.
- C. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- D. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.27 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.28 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016000 - Product Requirements for additional information.

1.29 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.30 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing and Electrical Trades add contract items to the chart provided by the Heating Trade or provide separate charts.

1.31 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.32 OPERATION AND MAINTENANCE MANUALS

- A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.
- B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.33 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.34 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.35 TEMPORARY HEAT

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary

1.36 TEMPORARY FACILITIES

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.37 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.38 SYSTEM START-UP AND TESTING

- A. All new heating and ventilating systems shall be started up and operated at normal operating temperature for a period of 24 hours to "bake-off" the equipment. The associated ventilation system shall run on 100% outside air during the bake-off for an additional eight hours to purge the building. This work shall be completed prior to occupancy or on a Saturday, with the Contractor responsible for being on site during the entire purge and bake-off operation.

1.39 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a \$50.00 charge per drawing file and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
 2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.40 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 210500

PART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

1.3 SUBMITTALS

- A. Submit manufacturer's data in accordance with Basic Mechanical/Electrical Requirements. Obtain approval prior to ordering material.
- B. Provide submittals for all items specified under Part 2 of this section.

PART 2 - PRODUCTS2.1 VALVES

- A. General: Valves shall have the following requirements:
1. Working pressure stamped or cast on bodies.
 2. Stem packing serviceable without removing valve from line.
 3. UL listed and FM approved and labeled for intended fire protection service. Sprinkler systems 175 WWP; standpipe 300 WWP; stamped/cast on body.
- B. Acceptable Manufacturers:
1. Gate Valves: Kennedy, Mueller, Nibco, Stockham, Victaulic.
 2. Butterfly/Ball Valves, Indicating Type: Grinnell, Kennedy, Milwaukee, Stockham, Victaulic.
 3. Check Valves: Grinnell, Kennedy, Nibco, Stockham, Victaulic.

2.2 GATE VALVES

- A. 2-1/2 in. and Larger: IBBM, resilient wedge disc, OS&Y, flanged ends, stems grooved for tamper switch, 200 WWP; Stockham Fig. G-610.

- B. 2 in. and Smaller: Bronze body and bonnet, OS&Y, threaded ends, solid wedge, 175 WWP; Stockham Fig. B-133.

2.3 BUTTERFLY/BALL VALVE

- A. 2-1/2 in. and Larger: Butterfly style, ductile iron body, lug type, aluminum bronze disc, stainless steel trim, EPDM seat, bubbletight shutoff, suitable for dead end service, gear operator, provision to tamper switch, 200 WWP; Stockham #LD-72UF.
- B. 2 in. and Smaller: Bronze body, threaded ends; indicating gear operator, provision for tamper switch; Milwaukee "Butterball".

2.4 CHECK VALVES

- A. 2-1/2 in. and Larger: IBBM, swing type, rubber faced disc, bolted flange cap, flanged ends; Stockham #G-940.
- B. Wafer Type, 2-1/2 in. and Larger: Cast iron body, aluminum-bronze disc plates, stainless steel hinge pin and spring, stainless steel bolts and fasteners, Buna-N seat for water temperatures up to 150°F at 200 psi; Stockham #WG-950.
- C. 2 in. and Smaller: Bronze body, swing type, rubber faced, threaded ends; Grinnell #3315.

2.5 PRESSURE REDUCING VALVES

- A. Ductile iron body construction, nylon reinforced diaphragm, nylon reinforced brass and stainless steel pilot valve, integral strainer, pressure relief valve, adjustable pressure range.
- B. Valve shall be UL listed and FM approved.
- C. Design Equipment: Tyco Model PRV-1.
- D. Acceptable Manufacturers: Cla-Val, Tyco, Viking.

2.6 MISCELLANEOUS

- A. Trim and Test Valves: Ball, plug, angle or globe type; bronze body; threaded ends; UL listed.
 - 1. Ball Valves: Bronze two-piece body, full port, threaded ends, chrome plated ball, blowout proof stem, reinforced TFE seats, 300 psi working pressure, UL listed, FM approved; Nibco Model KT-585-70-UL.

- B. Hose Thread Drain Valves:
 - 1. Ball Valve: Bronze body, hardened chrome ball with hose thread end, cap and chain; Watts #B6000CC (threaded connection).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide all shutoff, check, drain and other type valves as required by Code as indicated and as required for proper system maintenance, isolation and safety.
- B. Locate valves for easy access and provide separate support where necessary. Install valves with stems at or above the horizontal position. Install swing check valves in horizontal position with hinge pin level.
- C. Provide hose thread drain valves at all low points to enable complete drainage of all portions of the system.
- D. Install valves per respective listing/approval.
- E. Use ball valves for auxiliary drains and inspector test valves on dry pipe and pre-action systems.

END OF SECTION 210523

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services as required for the complete installation designed in Contract Documents.

1.3 QUALIFICATIONS

- A. All identification devices shall comply with ANSI A13.1 for lettering size, length of color field, colors, and viewing angles.

1.4 SUBMITTALS

- A. Submit manufacturer's technical product data and installation instructions for each identification material and device. Submit valve schedule for each piping system typewritten on an 8-1/2 in. x 11 in. paper (minimum), indicating code number, location and valve function. Submit schedule of pipe, equipment and name identification for review before labeling.

1.5 ACCEPTABLE MANUFACTURERS

- A. Allen Systems, Inc., Brady (W.H.) Co.; Signmark Div., Emedco, Industrial Safety Supply Co., Inc., Lab Safety Supply, Seton Name Plate Corp.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide manufacturer's standard products of categories and types required for each application. In cases where there is more than one type specified for an application, selection is installer's option, but provide single selection for each product category.
- B. All adhesives used for labels in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits as called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.

- C. For work within an existing building, the mechanical identification shall meet the intent of this section, but match the Owner's existing identification symbology.

2.2 PIPING IDENTIFICATION

A. Identification Types:

1. Snap-on type: Provide manufacturer's standard pre-printed, semi rigid snap-on, color coded pipe markers, complying with ANSI-A13.1.
2. Pressure sensitive type: Provide manufacturer's standard pre-printed, permanent adhesive, color coded, pressure sensitive vinyl pipe markers complying with ANSI A13.1. Provide a 360° wrap of flow arrow tape at each end of pipe label.
3. Stencil paint: Apply black or yellow stencil paint directly to covering or bare pipe; color to contrast with background. Stencil as follows:

| O.D. PIPE OR COVERING | SIZE STENCIL LETTER |
|---------------------------|---------------------|
| 3/4 in., 1 in., 1-1/4 in. | 1/2 in. |
| 1-1/2 in., 2 in. | 3/4 in. |
| 2-1/2 in. and over | 1-1/4 in. |

B. Lettering:

1. Piping labeling shall conform to the following list:

| PIPE FUNCTION | IDENTIFICATION |
|----------------------|----------------------|
| Compressed Air | COMPRESSED AIR |
| Fire Standpipe Water | FIRE STANDPIPE WATER |
| Fire Sprinkler Water | FIRE SPRINKLER WATER |
| Clean Agent | CLEAN AGENT |

2.3 VALVE IDENTIFICATION

A. Valve Tags:

1. Standard brass valve tags, 2 in. diameter with 1/2 in. high black-filled numerals. Attach to valve with brass jack chain and "S" hook. Identify between fire protection, heating and plumbing services with 1/4 in. letters above the valve number.
2. Equal to Seton Style No. M4507.

- B. Provide a sign for each control, sectional and drain valve identifying the portion of the building served in accordance with NFPA 13. Signs shall be permanently attached to the piping, the valve or the nearest wall. Signs shall not be hung from the piping of valves with wires or chains.

C. Valve Chart:

1. Provide valve chart for all valves provided as a part of this project. Frame and place under clear glass. Mount in Mechanical Room.

2.4 EQUIPMENT IDENTIFICATION

A. General:

1. Provide engraved vinyl nameplates for each major piece of mechanical equipment provided, 2-1/2 in. x 3/4 in. size.
2. Nameplates: Equal to Seton Style No. M4562.

2.5 ABOVE CEILING EQUIPMENT LOCATOR

- A. 3/4 in. diameter adhesive stickers placed on ceiling grid and color-coded.
- B. The color for all fire protection valves shall be RED.

PART 3 - EXECUTION

3.1 GENERAL

- A. Provide valve tags for all valves provided on project. Coordinate valve numbers with the Owner's existing numbering system. Do not duplicate numbers.
- B. Provide piping identification with directional flow arrows for all piping on project, maximum every 20'-0" or piping installed through rooms, provide at least one pipe label in each room, for each pipe function.
- C. Provide equipment tags for all equipment provided.

END OF SECTION 210553

PART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services required for the complete installation designed in Contract Documents.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's technical data sheets for each coating.
 - 1. Material analysis including vehicle type and percentage by weight and by volume of vehicle, resin, and pigment.
 - 2. Application instructions including mixing, surface preparation, compatible primers and topcoats, recommended wet and dry film thickness, recommended application methods.

1.4 GENERAL

- A. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green building Council LEED Credits EQ 4.1 and EQ 4.2.

1.5 QUALITY ASSURANCE

- A. Materials:
 - 1. All coating materials required by this section shall be provided by a single manufacturer, unless otherwise required or approved.
 - a. Contractor: Firm with successful experience in painting work similar in scope of work of this project.
 - b. Maintain throughout duration of the work a crew of painters who are fully qualified to satisfy requirements of the specifications.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Design Make:
 - 1. Sherwin Williams Company.
- B. Acceptable Makes:
 - 1. Devoe & Raynolds Company
 - 2. The Glidden Company
 - 3. Benjamin Moore & Company
 - 4. PPG Industries, Inc./Pittsburgh Paints
 - 5. Pratt & Lambert, Inc.
 - 6. Sherwin Williams Company

2.2 PRODUCTS

- A. Colors:
 - 1. As selected by Owner.
- B. Lead Content:
 - 1. Not more than 0.06 percent lead by weight (calculated as lead metal) in the total nonvolatile content of the paint or the equivalent measure of the lead in the dried film.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that surfaces and conditions are ready for work in accordance with coating manufacturer's recommendations.
- B. Prior to commencement of work, examine surfaces scheduled to be finished.
- C. Report any unsatisfactory conditions in writing.
- D. Do not apply coatings to unsatisfactory substrates.
- E. Beginning painting work on an area will be deemed construed acceptance of surfaces in that area.

3.2 SCOPE

- A. Fire protection components shall be painted by the Fire Protection Contractor.
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. See schedule for color code.
- C. Paint all hangers, rods and any other bare iron work in all exposed areas.
- D. Paint all exterior metal or iron including all piping, supporting metals, etc., unless furnished with a factory finish. This shall include galvanized steel. Paint with galvanized primer and finish with epoxy of color selected by Architect. Exterior metal painting shall include all exposed plumbing piping, fittings, valves, etc.
- E. Paint bare metal and touch up damaged finish on all fire protection equipment. Use heat resistant paint on all hot surfaces.
- F. Paint all piping exposed to view in all areas.
- G. Paint all piping connections.
- H. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contact must be touched up by Contractor responsible for same.

3.3 SURFACE PREPARATION

- A. Apply coatings to surfaces that are clean and properly prepared in accordance with manufacturer's instructions and as herein specified. Remove dirt, dust, grease, oils and foreign matter. Prepare surface for proper texture necessary to optimum coating adhesion and intended finished appearance. Plan cleaning, preparation, and coating operations to avoid contamination of freshly coated surfaces.
- B. Provide protection for non-removable items not called for coating. After application of coatings, install removed items. Use only skilled workmen for removal and replacement of such items.
- C. Protect surfaces not called for coating. Clean, repair, or replace to the satisfaction of the Engineer/Owner's Representative any surfaces inadvertently spattered or coated.
- D. Metal Work:
 - 1. Remove all oil and grease with non-flammable solvent. Remove all rust with steel wool.
 - 2. Patched Areas, Touch-up Areas. Clean and prepare all surfaces as required to provide a smooth, even substrate for proper application of finish.
 - 3. Contractor must examine areas and conditions under which paint is to be applied and notify Engineer in writing of conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.

3.4 APPLICATION

A. General:

1. Apply coatings in accordance with coating manufacturer's instructions and using application method best suited for obtaining full, uniform coverage of surfaces to be coated.
2. Apply successive coats after adequate cure of the preceding coat and within the recommended recoating time.
3. Complete coatings shall be free of defects such as runs, sags, variations in color, lap or brush marks, holidays, and skips.

B. Remove coatings not in compliance with this specification, reclean and re-prepare surfaces as specified, and apply coatings to comply with the contract documents.

3.5 SCHEDULE OF COATINGS FOR METAL SURFACES

A. Porous Surface:

1. The coating shall be Tough-Coat as manufactured by VAC Systems Industries, Foster 40-10, 40-20, or 40-23 as manufactured by Foster Products Corporation, or approved equal. Coating shall meet NFPA Standard 90A and 90B and contain an anti-microbial agent.

B. Non-Porous Surface:

1. The paint shall be Porta-Sept as manufactured by Porter Paints, Inc., Foster 40-26 as manufactured by Foster Products Corporation or approved equal. Paint shall contain an EPA registered anti-microbial, Intercept, which inhibits the growth of bacteria, mold, mildew and fungi.

END OF SECTION 210554

SECTION 211010

PIPING SYSTEMS AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.3 SUBMITTALS

- A. Provide a schedule of pipe materials, fittings and connections.
- B. Provide a detailed matrix listing the specific UL approved firestop system assembly to be used for each type of piping provided and each type of construction to be penetrated along with all associated UL assembly details.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Pipe and fittings shall be new, marked with manufacturer's name and comply with applicable ASTM and ANSI Standards.

2.2 STEEL PIPING AND FITTINGS

- A. Pipe: ASTM A53, Schedule 40 weight; black or galvanized finish as called for; ends chamfered for welding.
- B. Fittings: Same material and pressure class as adjoining pipe.
 - 1. Welded Fittings: Factory forged, seamless construction, butt weld type chamfered ends. Where branch connections are two or more sizes smaller than main size, use of "Weldolets", "Thredolets" or "Sokolets" acceptable. Mitered elbows, "shaped" nipples, and job fabricated reductions not acceptable unless specifically called for. Socket weld type, 2000 psi wp, where called for.
 - 2. Threaded Fittings: Class 125, cast or malleable iron, black or galvanized, as called for; UL listed and FM approved for fire protection systems. Street type 45° and 90° elbows are not acceptable. Provide Class 250 fittings for threaded systems operating at working pressures above 175 psi.

- C. Flanges, Unions, and Couplings:
 - 1. Threaded Connections:
 - a. Flanges: Cast iron companion type; for sizes 2-1/2 in. and larger.
 - b. Unions: Malleable iron, bronze to iron seat, 300 lb. wwp; for sizes 2 in. and smaller.
 - c. Couplings: Malleable iron. Steel thread protectors are not acceptable as couplings.
 - 2. Welded Connections:
 - a. Flanges: Welding neck type. Slip-on type not allowed unless noted and shall not be installed in conjunction with butterfly valves.
- D. Gauge and Instrument Connections: Nipples and plugs for adapting gauges and instruments to piping system shall be IPS brass.

2.3 THINWALL STEEL PIPE

- A. Pipe: ASTM A53, or A135, with Schedule 10 wall thickness for 2-1/2 in. through 5 in.; 0.134 in. for 6 in. and 0.188 in. for 8 in. and 10 in.; black or galvanized finish as called for; ends chamfered for welding.
- B. Fittings: Same construction as noted for steel pipe, ends chamfered for welded connections.

2.4 COPPER TUBE AND FITTINGS

- A. Pipe: ASTM B88; Type L, hard temper. Plans show copper tube sizes.
- B. Tees, Elbows, and Reducers: Wrought copper, ASME B16.22 or cast bronze, ASME B16.18; solder end connections.
- C. Unions and Flanges: 2 in. and smaller use unions, solder type, cast bronze, ground joint, 150 lb. swp: 2-1/2 in. and over use flanges, cast bronze, companion type, ASME drilled, solder connection, 150 lb. swp.
- D. Brazing Materials: Class BcuP-5 for brazing copper to brass, bronze to copper. Harris, Inc. "Stay-Silv 15" or approved equal.

2.5 SPECIAL FITTINGS

- A. Copper to Steel Piping:
 - 1. Dielectric pipe fittings.

2.6 DIELECTRIC PIPE FITTINGS

- A. Description: Assembly or fitting having insulating material isolating joined dissimilar metals to prevent galvanic action and stop corrosion.
- B. Unions: Factory fabricated, for 250 psi minimum working pressure at 180°F, threaded or solder ends, insulating material suitable for system fluid, pressure and temperature.
- C. Flanges: Factory fabricated, companion flange assembly, for 150 or 300 psig minimum pressure to suit system fluid pressures and temperatures with flange insulation kits and bolt sleeves.
- D. Acceptable Manufacturers: EPCO, Capitol Manufacturing, Victaulic, Watts or approved equal.

2.7 HANGERS, INSERTS AND SUPPORTS

- A. Hangers, Inserts, Clamps: B-Line, Grinnell, Michigan Hanger, PHD Manufacturing.
- B. Hangers:
 - 1. Adjustable, wrought malleable iron or steel with electroplated zinc or cadmium finish. Copper plated or PVC coated where in contact with copper piping. Hot-dipped galvanized finish for exterior locations.
 - 2. Adjustable ring type where piping is installed directly on hanger for piping 3 in. and smaller.
 - 3. Adjustable steel clevis type for piping 4 in. and larger.
 - 4. Nuts, washers and rods with electroplated zinc or cadmium finish. Hot-dipped galvanized finish for exterior locations.
- C. Spacing Schedule (Maximum Distance between Hangers (ft.-in.):

| NOMINAL PIPE SIZE (IN.) | 3/4 | 1 | 1-1/4 | 1-1/2 | 2 | 2-1/2 | 3 | 4 | 6 | 8 |
|-------------------------|-----|------|-------|-------|------|-------|------|------|------|------|
| Steel Pipe | N/A | 12-0 | 12-0 | 15-0 | 15-0 | 15-0 | 15-0 | 15-0 | 15-0 | 15-0 |
| Copper Tube | 8-0 | 8-0 | 10-0 | 10-0 | 12-0 | 12-0 | 12-0 | 15-0 | 15-0 | 15-0 |
| Rod Size (in.) | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 1/2 | 1/2 |

- D. Beam Attachments:
 - 1. C-Clamp style, locknut, restraining strap, electroplated finish, UL listed, FM approved for pipe sizes 2 in. and smaller, complying with NFPA 13 and 14.
 - 2. Center loaded style with clamp attachments that engage both edges of beam, electroplated finish, UL listed, FM approved, for pipe sizes larger than 2 in., refer to "Supports" for additional requirements, complying with NFPA 13 and 14.
- E. Inserts: Carbon steel body and square insert nut, galvanized finish, maximum loading 1300 lbs., for 3/8 in. to 3/4 in. rod sizes, reinforcing rods on both sides, MSS-SP-69 Type 19 or approved equal, complying with NFPA 13 and 14.

F. Supports:

1. For all piping larger than 2 in., provide intermediate structural steel members for hanger attachment. Members shall span across the bar joists at panel points of joists. Secure member to structure. Select size of members based on a minimum factor of safety of four.
2. For weights under 1,000 lbs.: "Drill-In" inserts, "U" shaped Channel, beam clamps or other structurally reviewed support. The factor of safety shall be at least four. Follow manufacturer's recommendations.
3. For Metal Decks: Drill hole through for hanger rods and imbed a welded plate in concrete or use devices designed for this application, with a safety factor of four.
4. Acceptable Manufacturers: Hilti, ITW Ramset, Phillips "Red Head" or approved equal.

G. Hangers for fire protection piping as specified and in accordance with NFPA 13 and NFPA 14. Hangers and building attachments shall be UL listed and FM approved for fire protection service.

2.8 PIPING ACCESSORIES

- A. Escutcheon Plates: Steel or cast brass, split hinge type with setscrew, high plates where required for extended sleeves. Chrome plated in finished areas.
- B. All bushings and nipples required for instruments and gauges shall be brass.

2.9 SLEEVES

A. Standard Type:

1. Schedule 40 black steel pipe sleeves for structural surfaces, two (2) pipe sizes larger than the pipe, and as recommended by the sealing element manufacturer. Provide full circle water stop collar for sleeves located within below grade walls, wet wells and waterproofed surfaces. The collar shall be fabricated from steel plate and welded to the sleeve around its entire circumference.
2. Sheet metal sleeves for nonstructural surfaces and existing construction. Sheet metal sleeves shall be 18 gauge minimum and braced to prevent collapsing.

2.10 SEALING ELEMENTS

- A. Expanding neoprene link type, watertight seal consisting of interlocking links with zinc plated bolts.
 1. Acceptable Manufacturers: Thunderline "Link-Seal" Series 200, 300 or 400, Pyropac, Calipco.

2.11 FIRESTOP SYSTEM FOR OPENINGS THROUGH FIRE RATED WALL AND FLOOR ASSEMBLIES

- A. Materials for firestopping seals shall be listed by an approved independent testing laboratory for "Through-Penetration Firestop Systems". The system shall meet the standard fire test for Through-Penetration Firestop Systems designated ASTM E814. Firestop system seals shall be provided at locations where piping pass through fire rated wall, floor/ceiling, or ceiling/roof assembly. Minimum required fire resistant ratings of the assembly shall be maintained by the Firestop System. Installation shall conform to the manufacturer's recommendations and other requirements necessary to meet the testing laboratory's listing for the specific installation.

2.12 PIPING MATERIALS AND SCHEDULE

- A. See Exhibit "A" - Piping Materials at end of this Section for Fire Protection piping.
- B. See Exhibit "B" - Testing at end of this Section for Fire Protection piping.

PART 3 - EXECUTION

3.1 EQUIPMENT AND SYSTEMS

- A. Install equipment and systems in accordance with provisions of each applicable section of these Specifications, and Local/State Codes/Regulations having jurisdiction. Accurately establish grade and elevation of piping before setting sleeves. Install piping without springing or forcing, except where specifically called for, making proper allowance for expansion and anchoring. Changes in size shall be made with reducing fittings. Reducing couplings are not acceptable. Arrange piping at equipment with necessary offsets, unions, flanges, and valves, to allow for easy part removal and maintenance. Offset piping and change elevation as required, to coordinate with other work. Avoid contact with other mechanical or electrical systems. Provide adequate means of draining and venting systems. Conceal piping unless otherwise called for.
- B. Copper tubing shall be cut with a wheeled tubing cutter or other approved copper tubing cutter tool. The tubing must be cut square to permit proper joining with the fittings. Ream pipes after cutting and clean before installing.
- C. Cap or plug equipment and pipe openings during construction. Install piping parallel with lines of building, properly spaced to provide clearance for insulation. Make changes in direction and branch connections with fittings. Do not install valves, unions and flanges in inaccessible locations. Materials within a system and between systems shall be consistent. If this is not possible, install dielectric fittings.

3.2 PIPING OVER ELECTRICAL EQUIPMENT

- A. Contractor shall route piping to avoid installation directly over electric equipment, including, but not limited to panels, transformers, disconnects, starters, motor control center, adjustable speed drives and fused switches. In the event it cannot be avoided, the Contractor shall notify the Engineer in writing and provide a sheet metal drip shield under the pipe which extends 3 ft. - 0 in. beyond the electrical equipment. Provide drain for drip shield and pipe to above floor drain or to the exterior.
- B. Piping shall not be installed in the dedicated electric and working space as defined by NEC 110. Dedicated electrical space is generally equal to the depth and width of electrical equipment, and extends 6 ft. above the electrical equipment, or to a structural ceiling. Dedicated working space is a minimum of 30 in. wide or the width of equipment (whichever is larger) a minimum of 6 ft.-6 in. tall, with a depth of 3ft. to 9 ft. depending on the voltage.

3.3 HANGERS, INSERTS AND SUPPORTS

- A. Piping shall not be supported by wires, band iron, chains, from other piping, or by vertical expansion bolts. Support piping with individual hangers from concrete inserts, welded supports, or beam clamps of proper configuration and loading design requirements for each location; replace if not suitable. Follow manufacturer's safe loading recommendations. Suspend with rods of sufficient length for swing and of size called for, using four (4) nuts per rod. Provide additional structural steel members, having one coat rustproof paint, where required for proper support. Hangers, when attached to joists, shall only be placed at the top or bottom chord panel point. Only concentric type hangers are permissible on piping larger than 2-1/2 in.; "C" types are permitted for piping 2 in. and smaller on joists. Provide riser clamps for each riser at each floor.

3.4 PIPE CONNECTIONS

- A. Threaded Connections: Clean out tapering threads, made up with pipe dope; screwed until tight connection. Pipe dope must be specifically selected for each application.
- B. Brazed Connections: Make joints with silver brazing alloy in accordance with manufacturer's instructions. Remove working parts of valves before applying heat.
- C. Dielectric Pipe Fittings: Protect fittings from excessive heat.

3.5 WELDING

- A. Welding shall be performed in compliance with the welding procedure specifications prepared by the National Certified Pipe Welding Bureau. Welded piping fabricated by qualified welder. Use certified welder where specifically required by code or insurance company. If indicated and permitted for fire protection systems, all provisions for welded pipe shall additionally be in accordance with NFPA Standard 13. Use full length pipe where possible; minimum distance between welds, 18 in. on straight runs. Welds

must be at least full thickness of pipe with inside smooth and remove cutting beads, slag and excess material at joints; chamfer ends. Minimum gap 1/8 in., maximum 1/4 in., for butt welds. Overlaps on position and bench welds to be not less than 3/4 in. One internal pass and one external pass minimum required on slip-on flanges. Do not apply heat to rectify distorted pipe due to concentrated welding; replace distorted pipe.

- B. When welding galvanized pipe, apply cold galvanizing on joint following welding.

3.6 SLEEVES

- A. Provide for pipes passing through floors, walls or ceilings. Not required for floors that are core-drilled, except where floor is waterproofed. Extend 1/8 in. above finished floor in finished areas. In above grade Mechanical Rooms and other areas with floor drains use steel pipe sleeves 2 in. above floor. Use steel pipe sleeves in bearing wall, structural slabs, beams and other structural surfaces, and where called for. Sleeves shall be as small as practical, consistent with insulation, so as to preserve fire rating. Fill abandoned sleeves with concrete.

3.7 SLEEVE PACKING

- A. Seal void space at sleeves as follows:
 - 1. Interior locations: Firmly pack with fiberglass and caulk.
 - 2. Exterior walls above grade: Use sealing element.
 - 3. Cored holes: Use sealing element.
 - 4. Fire rated, partitions and floor slabs: Use fire rated sealing elements, materials and methods. Provide per manufacturer's instructions to maintain firestop.
 - 5. Waterproofed walls/floors: Use waterproof sealing element, device or compound.

3.8 ESCUTCHEON PLATES

- A. Provide polished chrome setscrew type escutcheon plates for all exposed piping passing through floors, walls or ceilings, in all rooms except in Boiler, Fan and Mechanical Rooms.

3.9 TESTS

- A. Fire suppression systems shall be hydrostatically tested at 200 psi for two (2) hours in accordance with NFPA 13 and 14.
- B. Provide all necessary items to complete proper testing of work. Perform all testing in accordance with governing Codes, local utilities and other agencies having jurisdiction and as specified. Pay all costs to perform tests. Perform all testing in a safe manner.

3.10 PIPE LINE SIZING

- A. Pipe sizes called for are to be maintained. Pipe size changes made only as reviewed by Owner's Representative and shall be justified by hydraulic calculations. Where discrepancy in size occurs, the larger size shall be provided.

EXHIBIT "A" - PIPING MATERIALS
(Notes at end of Exhibit "A")

| <u>SERVICE</u> | <u>PIPE MATERIALS</u> | <u>FITTINGS</u> | <u>CONNECTIONS</u> |
|------------------------------|---|-----------------------------------|---------------------------|
| Sprinkler (wet) | Schedule 40, black steel, 2 in. and smaller | Cast or malleable iron | Threaded |
| | "Thinwall" black steel, 2-1/2 in. and larger | Butt welded steel | Welded |
| | Schedule 40, black steel 2-1/2 in. and larger | Butt welded steel | Welded |
| Sprinkler dry and pre-action | Schedule 40, galvanized steel, 2 in. and smaller | Galvanized cast or malleable iron | Threaded |
| | Schedule 40, galvanized steel, 2-1/2 in. and larger | Galvanized butt welded steel | Welded |
| Fire standpipe | Schedule 40, black steel, 2-1/2 in. and smaller | Malleable iron | Threaded |
| | "Thinwall" black steel, 3 in. and larger | Butt welded steel | Welded |
| | Schedule 40, black steel, 3 in. and larger | Butt welded steel | Welded |
| Compressed air piping | Schedule 40, galvanized steel | Galvanized malleable iron | Threaded |
| Clean Agent | Schedule 40, black steel | Cast or malleable iron | Threaded |
| | Schedule 40, black steel | Butt welded steel | Welded |

NOTES FOR EXHIBIT A:

NOTE 1: Provide schedule 40 galvanized steel pipe and fittings for all aboveground exterior locations passing through exterior walls such as downstream of inspector's test and auxiliary drain valves, between fire department connection and associated check valve, between fire pump test header and associated control valve, and where called for.

NOTE 2: Dry and Pre-Action piping systems shall be pitched as described in NFPA 13 to facilitate the removal of moisture from the system to minimize internal corrosion. Provide auxiliary drains as required to assure entire system is drainable.

NOTE 3: Clean Agent piping shall be rated for no less than the pressures listed in NFPA 2001.

EXHIBIT "B" - TESTING

SERVICE

TEST REQUIREMENTS

Sprinklers Test hydrostatically at 200 psi for two (2) hours in accordance with NFPA 13.

Standpipes Test hydrostatically at 200 psi for two (2) hours in accordance with NFPA 14.

END OF SECTION 211010

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Document.

1.3 QUALITY ASSURANCE

- A. Comply with the 2015 International Code referenced edition of the following NFPA Standards:
 - 1. National Fire Protection Association (NFPA):
 - a. NFPA 14: Standard for the Installation of Standpipe and Hose Systems.
 - b. NFPA 25: Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - c. NFPA 72: National Fire Alarm Code.
 - d. NFPA 241: Standard for Safeguarding Construction, Alteration and Demolition Operations.
- B. Follow all requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards and listings/approvals:
 - 1. Factory Mutual Engineering Corporation (FM) Approval Guide and Loss Prevention Data Sheets.
 - 2. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory.
 - 3. 2015 International Fire Code.
 - 4. OSHA Rules and Regulations.
 - 5. All requirements of Insurance Underwriter and other Authorities Having Jurisdiction.
- C. Equipment, devices, hangers and components shall be UL listed **and** FM approved and labeled for the intended fire protection service.
- D. Fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection standpipe systems.
- E. Preparation of working plans, calculations and site observation of systems shall be completed by a NICET Level III technician under the direction of a qualified State of Oklahoma Registered Professional Engineer.

1.4 SYSTEM DESCRIPTION

- A. The fire system shall be an automatic wet, Class I standpipe system.
 - 1. System shall be arranged:
 - a. With the supply valves open and water pressure maintained at all times.
- B. Fire department connection(s) shall be provided to allow the servicing fire department to augment the system's normal automatic water supply.
- C. The system shall be hydraulically calculated in accordance with all provisions of the Contract Documents and any Authority Having Jurisdiction.
- D. Water supply control valves shall be both electrically supervised and mechanically locked for proper position. Waterflow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to standpipe equipment shall be by Division 26. Furnish wiring diagrams for all equipment.
- E. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a. Manufacturer, model number.
 - b. Materials, size, finish and type of connection.
 - c. Pressure ratings of components.
 - d. FM approval and UL listing.
- B. Certification: Submit Contractor's NICET Certification.
- C. Drawings and Calculations:
 - 1. All drawings and calculations shall be signed and sealed by a State of Oklahoma Registered Professional Engineer.
 - 2. Submit complete NFPA 14 drawings, hydraulic calculations, water supply data and equipment schedule for the system to the Owner's Representative, Insurance Underwriter, and other Authorities Having Jurisdiction.
- D. Record Drawings and Documents:
 - 1. Submit Record Drawings, Test Reports and NFPA Above and Below Ground Material and Test Certificates to the Owner's Representative, Insurance Underwriter and other Authorities Having Jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Mixing of manufacturers or models of the same or similar component will not be acceptable.

2.2 FIRE DEPARTMENT CONNECTION

- A. Cast brass; straight or angle body as required; two-way lug swivel inlets with individual drop clappers; cast brass; raised letter escutcheon labeled "STANDPIPE"; matching brass plugs and chains.
 - 1. 2-1/2 in. x 2-1/2 in. x 2-1/2 in. x 6 in.
 - 2. 2-1/2 in. hose threads shall match those in use by the local Fire Department.
 - 3. Polished chrome plated escutcheon, inlets, plugs, and chains.
 - 4. Design Equipment:
 - a. Horizontal Flush Wall Type: Potter-Roemer 5020 Series.
- B. Acceptable Manufacturers: Badger-Powhatan, Croker, Elkhart, Potter-Roemer or approved equal.

2.3 HOSE VALVES AND CABINETS

- A. Hose Valves: Brass angle body, spoked wheel handle, 300 psi wwp, polished brass, threads shall conform to requirements of local Fire Department.
 - 1. 2-1/2 in. hose valve: 2-1/2 in. female inlet by 2-1/2 in. NST male outlet with matching finish, lugged, 2-1/2 in. x 1-1/2 in. NST brass reducer and 1-1/2 in. NST lugged brass cap and chain.
 - a. Design Equipment: Potter-Roemer Fig. 4065.
- B. Cabinets: Hollow door construction; semi-concealed continuous hinge; duo-panel door with double strength glass; 20 gauge steel tub with baked white enamel; baked white prime coat steel door, frame and exposed trim; handle with cam action or friction latch. Recessed type complete with the following equipment:
 - 1. 2-1/2 in. fire hose valve cabinet: 2-1/2 in. fire department valve with 2-1/2 in. x 1-1/2 in. reducer and cap.
 - a. Approximately 24 in. x 24 in. x 10 in.
 - b. Design Equipment: Potter-Roemer 1830 Series.
- C. Acceptable Manufacturers: Badger-Powhatan, Croker, Elkhart, Potter-Roemer or approved equal.

2.4 FIRE PUMP TEST HEADER

- A. General: Horizontal, flush, cast brass body complete with nipples, gate valves, caps, chains, ball drips and raised letter escutcheon.
 - 1. 8 in. manifold body inlet and three (3) 2-1/2 in. outlets.
 - 2. Test header shall be sized to flow the system demand, including hose stream demand where applicable. Maximum flow rate per 2-1/2 in. outlet shall be 250 GPM.
 - 3. 300 psi wwp permanently attached, non rising stem, brass/bronze 2-1/2 in. NST male thread outlet gate valves.
 - 4. Cast brass caps, chains and escutcheon labeled backflow preventer test connection.
 - 5. Polished chrome plated finish.
 - 6. Acceptable Manufacturers: Badger Pocohattan, Croker, Elkhart, Potter-Roemer or approved equal.

2.5 SYSTEM COMPONENT IDENTIFICATION

- A. Control, drain and sectional valves shall be provided with permanently marked identification signs of baked enamel substantial metal construction. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of the sign.
- B. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves.
- C. Provide additional signs as required such as for fire department use only; pressure excess 150 psi at this valve, dry standpipe for fire department use only, etc., and decals identifying contents of each cabinet assembly.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense.
- B. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.
 - 1. Piping shall be installed concealed above finish ceiling areas and in fire rated stair enclosures.
 - 2. Install hose valves to provide a minimum 3 in. clearance around the entire threaded connection to facilitate hose connection.

3. Install 2-1/2 in. fire department valves 3 ft. above finished floor. For valves in cabinets, install with valve discharge straight out of cabinet or out and down towards floor at about 45 degrees.
 4. Fire department connections shall be installed 3 ft. above finished grade.
 5. Pipe ball drip valves to discharge at a floor drain or to the exterior. Pipe 2 in. main drains and water motor gong drains to discharge to the exterior at approximately 2 ft. above finished grade.
 6. Provide an accessible pressure gauge near the topmost outlet of each standpipe arranged to drain.
 7. Piping from the main standpipe to remote hose valves shall be one size larger than the valve and serve only one valve per connection to the main standpipe.
 8. Exposed pipe shall be left clean for painting.
- C. A standpipe system shall be provided for use by the local Fire Department at all times during construction. Follow all requirements of the local Fire Department, OSHA, and Contract Documents.
1. Provide 18 in. x 18 in., NFPA 178 style, reflective finish signs identifying duplex fire department connections during construction.
 2. Provide the system with temporary 1-1/2 in. listed lined hose reel or rack assemblies and water supply so not more than 100 ft. of hose covers all portions of any floor during construction.
 3. Notify the local Fire Department in writing that the temporary standpipe is in service, the locations of fire department connections and 2-1/2 in. hose valves, and hose threads utilized. Obtain and deliver a copy of the fire department's written acknowledgement to the Owner's Representative.
- D. Coordinate and activate the system to operational status as soon as possible.

3.2 PIPING, VALVES, HANGERS, ETC.

- A. Refer to other applicable sections.
- B. All piping shall be installed to permit drainage of the system through a main drain valve. Where a change in piping direction prevents drainage of the system, auxiliary drains shall be provided. The auxiliary drain assembly shall consist of a lockable ball valve, nipple and cap or plug. Pipe drain to an accessible location.

3.3 TESTS

- A. General:
1. Pipe installation shall be inspected by Owner's Representative prior to being covered by building construction or backfill.
 2. Give the Owner's Representative, advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed.

3. Correct system leaks prior to final test. Do not utilize water additives, caulking, etc. to correct leaks. Provide appliances, equipment, instruments, devices and personnel.
- B. Flushing: Follow Contract Documents and utilize open end pipe sections, if possible.
- C. Pressure Tests:
1. Hydrostatic tests: Minimum 200 psi and in accordance with NFPA 14 for two (2) hours.
 - a. Air test not accepted as final test.
 2. Do not subject existing systems to excess pressures.
- D. Alarm Tests:
1. Demonstrate activation of alarms.
- E. Flow Tests: Give advance notice to the local Fire Department so they may be present if they desire.
1. Flow 500 gpm from the topmost outlet of the most remote standpipe.
 2. Concurrently flow 250 gpm from the topmost outlet of each of the other standpipes for a total flow not to exceed 500 gpm.
 3. Record the residual pressures and flows at the topmost outlet of each standpipe during the test.

3.4 SYSTEM TURNOVER

- A. Prior to final acceptance, instruct the Owner's Representative and the local Fire Department in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed.
- B. Provide one new original pamphlet of NFPA 25 to the Owner's Representative and indicate maintenance inspection and testing provisions to comply with local fire codes.
- C. Notify the local Fire Department in writing that the permanent system is operational.

END OF SECTION 211200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents.

1.3 QUALITY ASSURANCE

- A. Comply with the 2015 International Code referenced edition of the following National Fire Protection Association (NFPA) Standards:
 - 1. NFPA 13: Standard for the Installation of Sprinkler Systems.
 - 2. NFPA 25: Inspection, Testing and Maintenance of Water-Based Fire Protection Systems.
 - 3. NFPA 72: National Fire Alarm Code.
 - 4. NFPA 241: Standard for Safeguarding Construction, Alteration and Demolition Operations.
- B. Follow all requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards, and listings/approvals:
 - 1. Factory Mutual Engineering Corporation (FM) Approval Guide and Loss Prevention Data Sheets.
 - 2. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory.
 - 3. 2015 International Fire Code.
 - 4. OSHA Rules and Regulations.
 - 5. Requirements of Insurance Underwriter and other Authorities Having Jurisdiction.
- C. Equipment, devices, hangers and components shall be UL listed **and** FM approved and labeled for the intended fire protection service.
- D. The fire protection work shall be performed by an experienced firm regularly engaged in the installation of fire protection sprinkler systems.
- E. Preparation of working plans, calculations and site observation of systems shall be completed by a NICET Level III technician under the direction of a qualified State of Oklahoma Registered Professional Engineer.

1.4 SYSTEM DESCRIPTION

- A. The fire protection system shall be a wet pipe, dry pipe and preaction automatic sprinkler system arranged to properly protect all spaces.
- B. Water is supplied through a 6 in. underground water main to the system's existing fire pump. Water supply data at the underground main indicates the following:
 - 1. 125 psi static.
 - 2. 115 psi residual with 998 gpm flowing.
- C. The flow test information above is submitted for information only. This contractor shall arrange for a new flow test on the municipal main prior to performing hydraulic calculations. The more restrictive of these two tests shall be used as the basis of design. The existing fire pump is rated for 750 gpm at 65 psi.
- D. The system shall be hydraulically calculated in accordance with all provisions of the Contract Documents and any Authority Having Jurisdiction.
- E. Use of room design method will not be permitted. Calculations shall be based upon the specific hazard for the areas being protected. The following minimum requirements shall be provided as actually installed in the protected spaces.
 - 1. Light hazard: These areas shall include: Offices, lobby, toilet rooms, corridors, etc.
 - a. Water density: 0.10 gpm/sq. ft.
 - b. Hydraulic remote area: 1,500 sq. ft.
 - c. Interior hose demand: 100 gpm.
 - d. Exterior hose demand: 150 gpm.
 - 2. Ordinary Hazard Group 2 (Wet Pipe): These areas shall include: Gaming, storage, kitchen, etc.
 - a. Water density: 0.20 gpm/sq. ft.
 - b. Hydraulic remote area: 2,500 sq. ft.
 - c. Interior hose demand: 100 gpm.
 - d. Exterior hose demand: 150 gpm.
 - 3. Ordinary Hazard Group 2 (Dry Pipe): These areas shall include: Porte Cochere.
 - a. Water density: 0.20 gpm/sq. ft.
 - b. Hydraulic remote area: 3,500 sq. ft.
 - c. Interior hose demand: 100 gpm.
 - d. Exterior hose demand: 150 gpm.
- F. Maximum coverage for any sprinkler head shall not exceed NFPA requirements and the listing for the sprinklers provided.

- G. A minimum 10% safety factor shall be provided between the available municipal water supply curve and the total system demand point. The total system demand point shall be at the municipal water main and include the calculated sprinkler and interior hose stream demands plus the exterior hose stream demand at the residual pressure required for proper system operation.
- H. The maximum flow velocity shall not exceed 20 ft. per second in the piping system and 15 ft. per second in mains with paddle type waterflow indicators.
- I. Water supply control valves shall be electrically supervised and mechanically locked for proper position. Waterflow and supervisory circuits shall be in accordance with the requirements of electrical specifications. Electric connections to sprinkler system shall be by Division 26. Furnish wiring diagrams for all equipment.
- J. Provide 3/16 in. x 1 in. cadmium plated carbon steel chains and master keyed all brass case hardened padlocks to lock water supply valves in the proper position.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Submit manufacturer's catalog cut, specifications and installation instructions for each item or component of fire protection system. Clearly indicate pertinent information such as, but not limited to:
 - a. Manufacturer's model number.
 - b. Materials, size, finish and type of connection.
 - c. Pressure ratings of components.
 - d. FM approval and UL listing.
- B. Certification: Submit Contractor's NICET certification and number.
- C. Samples:
 - 1. If requested, submit sample of sprinklers.
- D. Drawings and Calculations:
 - 1. All drawings and calculations shall be signed and sealed by a State of Oklahoma Registered Professional Engineer.
 - 2. Submit complete NFPA 13 drawings and hydraulic calculations with cross reference to applicable drawings, water supply data, and equipment schedule with ratings for the system to the Owner's Representative, Insurance Underwriter, and other Authorities Having Jurisdiction.
 - 3. Submit hydraulic calculations for each design density/remote area with items in NFPA 13 incorporated including sketches to indicate flow quantities, and sprinklers operating and direction of flow for pipes in looped and gridded systems.

4. Drawing shall be fabrication drawings provided to indicate actual sprinkler, standpipe and equipment layouts. Drawings shall be 1/8" = 1'-0" scale on reproducible sheets of uniform size. Drawings shall show all data required by NFPA 13.
 5. Submit drawings in one (1) complete package.
- E. Record Drawings and Documents:
1. Submit Record Drawings, hydraulic calculations, test reports, and NFPA Above and Below Ground Material and Test Certificates to the Owner's Representative, Insurance Underwriter and other Authorities Having Jurisdiction.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Mixing of manufacturers or models of the same or similar component will not be acceptable.

2.2 PRESSURE GAUGES

- A. Water Pressure Gauge:
1. Anodized aluminum case, 3-1/2 in. diameter, glass lens, brass movement, 1/4 in. NPT male bottom connection with gauge cock.
 2. 0 to 300 psi range, in 5 psi increments with accuracy to meet ANSI B40.1.
- B. Air Pressure Gauge:
1. Anodized aluminum case, 3-1/2 in. diameter, glass lens, brass movement, 1/4 in. NPT male bottom connection with gauge cock.
 2. 0 to 80 psi range, in 1 psi increments with accuracy to meet ANSI B40.1.

2.3 SPRINKLER EQUIPMENT

- A. Riser Check Valve: Vertical style, grooved end, cast iron body and stainless steel clapper with replaceable facing.
1. Trim:
 - a. Main drain and valve.
 - b. Gauges with gauge cocks.
 - c. Galvanized pipe and trim fittings.
 2. Design Equipment: Viking Model F-1.
 3. Acceptable Manufacturers: Globe, Reliable, Tyco, Victaulic, Viking or approved equal.

- B. Dry Pipe Valve: Vertical style with grooved ends, cast iron body, replaceable clapper facing with right or left hand trim and controls for automatic operation.
1. Trim:
 - a. Main drain and valve.
 - b. Gauges with gauge cocks.
 - c. Galvanized pipe and trim fittings.
 - d. Low air and waterflow alarm switches.
 - e. Automatic air pressure maintenance device.
 - f. Air relief valve set at 5 psi in excess of maximum pressure that should be on system.
 - g. Anti-flooding type accelerator with trimmings.
 2. Design Equipment: Viking Model G.
 3. Acceptable Manufacturers: Globe, Reliable, Tyco, Victaulic, Viking or approved equal.
- C. Double Interlock Pre-Action Valve: Vertical style with grooved ends, cast iron body and stainless steel clapper with replaceable facing.
1. Trim:
 - a. Main drain and valve.
 - b. Deluge riser assembly including control valves, solenoid valve, manual emergency release and alarm test.
 - c. Electric actuation.
 - d. Water flow pressure alarm switch.
 - e. Pressure maintenance device.
 - f. Releasing/control panel.
 - g. Electric emergency station.
 - h. Thermal detectors.
 - i. Fire alarm annunciators, pull stations, etc.
 - j. Automatic pressure regulating device.
 - k. Gauges with gauge cocks.
 - l. Galvanized pipe and fittings with all valves required.
 - m. Double interlock switch/gauge kit.
 2. Design Equipment: Viking Model G (double interlock).
 3. Acceptable Manufacturers: Globe, Reliable, Tyco, Victaulic, Viking or approved equal.
- D. Air Compressor - Riser Mounted Type: Direct drive, air cooled, single stage, oil less compressor, air filter, safety relief valve, field adjustable pressure range, mounting bracket, sized to pump system to 40 psi in less than 30 minutes, with air maintenance device. Listed for fire protection use.
1. Design Equipment: General.
 2. Acceptable Manufacturers: General, Reliable, Viking or approved equal.

2.4 SPRINKLERS AND ACCESSORIES

- A. Brass or bronze, 1/2 in. orifice, 1/2 in. NPT. 155°F ordinary temperature classification for light and ordinary hazards. Use 286°F sprinklers in Mechanical, Electrical and Elevator Rooms; in vicinity of heat equipment/sources; and in accordance with NFPA 13.
- B. Finished Ceiling Areas Accessible to the Public: Concealed pendant sprinklers. Coverplates shall be factory painted custom colors. Colors shall be selected by Architect.
- C. Finished Ceiling Areas not Accessible to the Architect: White polyester finish sprinklers with matching two (2) piece semi-recessed escutcheon.
- D. Unfinished Ceiling Areas Accessible to the Public: Black finish pendent or upright sprinklers as required.
- E. Unfinished Ceiling Areas not Accessible to the Public: Natural brass/bronze finish pendent or upright sprinklers and required.
- F. Sprinkler Types and Design Equipment:
 - 1. Quick Response Pendent and Upright: Viking Model VK302/VK300.
 - 2. Quick Response Concealed Pendent: Viking Model VK462.
 - 3. Quick Response Concealed Dry Pendent: Tyco Model DS-C.
 - 4. Quick Response Horizontal Sidewall: Viking Model VK305.
 - 5. Quick Response Dry Pendent and Horizontal Sidewall: Viking Model VK180.
 - 6. Quick Response Extended Coverage Concealed Pendent: Viking Model VK538.
 - 7. Corrosion Resistant: Provide for all exterior areas. Furnish with factory applied electroless nickel PTFE coating.
- G. Flexible Sprinkler Drops:
 - 1. FM Approved braided Type 304 stainless steel tube with union joints, factory tested to 400 psi and listed for up to three (3) 90° bends including bracket for mounting to ceiling or building structure.
 - a. Design Equipment: Victaulic "VicFlex".
- H. Sprinkler Guards:
 - 1. Steel wire cage with base plate and retaining clamps. Same manufacturer as sprinkler.
 - 2. Design Equipment: Viking G Series.
- I. Sprinkler Cabinets and Spare Sprinklers:
 - 1. Steel or aluminum construction with shelves and shell holes to accommodate the number of spare sprinklers required by NFPA 13.
 - 2. Bright red finish with hinged front door and label.
 - 3. Sprinkler wrenches compatible for each type used.
 - 4. Spare sprinklers for each system of the type and proportion of those used in each system.

- 5. Design Equipment: Viking.
- J. Acceptable Manufacturers: Reliable, Tyco, Victaulic, Viking or approved equal.

2.5 ALARM EQUIPMENT

A. Waterflow Pressure Switch:

- 1. Pressure activated waterflow alarm switch with retard, steel enclosure and cover, adjustable differential type, SPDT contacts, 24 volt DC, 1/2 in. pressure connection, 250 psi rated.
- 2. Design Equipment: Potter Electric #WFSR-F.

B. Air Pressure Supervisory Switch:

- 1. For remote low air pressure supervisory alarm and for air compressor operation, steel enclosure and cover, adjustable differential type, SPDT contacts, 24 volt DC, 1/2 in. pressure connection compatible with system devices, 250 psi rated.
- 2. Design Equipment: Potter Electric #PS40A.

C. Paddle Waterflow Detectors:

- 1. Adjustable retard feature, SPDT contacts, 24 volt DC, 250 psi rated.
- 2. Design Equipment: Potter Electric #VSR Series.

D. Tamper Switches:

- 1. Integral with valve or separate device installed on valve to actuate alarm upon valve movement, steel enclosure, SPDT contacts, 24 volt DC, mounting brackets and hardware.
- 2. Design Equipment: Potter Electric #OSYSU (for OS&Y valves) and #PIVSU-A (for post indicator and butterfly valves).

E. Acceptable Manufacturers: Autocall, Potter Electric, System Sensor or approved equal.

2.6 INSPECTOR'S TEST EQUIPMENT

A. Test and Drain Valve:

- 1. Combined test and drain valves, sight glass and interchangeable restricting orifice, sized for smallest orifice in sprinkler zone.
- 2. Design Equipment: AGF Manufacturing "Test and Drain".
- 3. Acceptable Manufacturers: AGF Manufacturing, Viking, Victaulic or approved equal.

2.7 SYSTEM COMPONENT IDENTIFICATION

- A. At control, test and drain valves, provide permanently marked identification signs constructed of 18 gauge steel with baked enameled finish. The signs shall be permanently mounted on the piping or wall at the valve, or on the valve, but shall not be hung on the valve with wires or chains which permits easy removal of the sign. The sign shall clearly indicate the valve's purpose and what portion of the structure it serves. Additional signs, shall be provided at each alarm check and dry pipe valve to clearly indicate hydraulic calculation data.

2.8 ADDITIONAL SPRINKLERS AND SPRINKLER GUARDS

- A. Include allowance for providing twenty (20) additional sprinklers with related piping, fittings, hangers and ten (10) additional sprinkler guards installed at locations where job conditions or equipment selections may be required. Provide a credit for sprinklers and guards not installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The nature of the work requires coordination with other trades. Shop fabrication shall be done at the Contractor's risk. Relocation of piping and components to avoid obstructions may be necessary. Relocation, if required, shall be done at the Contractor's expense. The installation shall be performed in a workmanlike manner as determined by the Owner's Representative and in accordance with the Contract Documents, manufacturer's printed installation instructions, and submitted and Owner's Representative reviewed drawings.
- B. Piping shall not pass directly over electric panelboards, switchboards, motor control centers, and similar electric and telephone equipment. However, protection for these spaces shall be provided.
- C. Piping shall be installed concealed above finish ceiling area with sprinklers located in the center or quarter points of ceiling tiles where ceiling tiles are used.
- D. Provide a readily removable flushing connection consisting of a cap at each end of cross mains.
- E. Provide sprinkler guards for sprinklers in mechanical and storage spaces, less than 8 ft. above finished floor subject to mechanical damage.
- F. Pipe ball drip valves at a floor drain or to the exterior. Pipe 2 in. main drains and water motor gong drains to discharge to the exterior at approximately 2 ft. above finished grade.
- G. Securely install the spare sprinkler cabinets to the building wall at the main riser.
- H. Inspector's test valves and dry system auxiliary drains shall be installed 7 ft. or less above the finished floor.

- I. Upright sprinklers directly on branch lines shall be installed with their frame parallel to the piping.
- J. Provide sprinkler protection under ductwork, groups of ductwork and other obstructions to water spray and distribution. Use intermediate level sprinklers if subject to waterspray from above.
- K. Exposed pipe shall be left clean for painting.
- L. Coordinate and activate the systems or portions of the system to operational status as soon as possible.

3.2 PIPING, VALVES AND HANGERS

- A. Refer to other applicable sections.
- B. All piping shall be installed to permit drainage of the system through a main drain valve. Where a change in piping direction prevents drainage of the system, auxiliary drains shall be provided. The auxiliary drain assembly shall consist of a lockable ball valve, nipple and cap or plug and shall be located 7 ft. or less above the finished floor. Pipe drain to an accessible location.

3.3 TESTS

- A. General:
 - 1. Pipe installation shall be inspected by Owner's Representative prior to being covered by building construction or backfill.
 - 2. Give the Owner's Representative advance notice of final tests. Perform tests in a safe manner. Provide written certification that tests have been successfully completed. Use NFPA Above and Below Ground Material and Test Certificate Forms.
 - 3. Correct system leaks prior to final test. Do not utilize water additives, caulking, etc. to correct leaks. Provide appliances, equipment, instruments, devices and personnel.
 - 4. Flushing: Follow Contract Documents and utilize open end pipe sections if possible.
- B. Pressure Tests:
 - 1. Hydrostatic Tests: Minimum 200 psi and in accordance with NFPA 13 for two (2) hours.
 - a. Air test not accepted as final test.
 - 2. Air Test: Minimum 40 psi for 24 hours with loss not to exceed 1.5 psi within 24 hour duration.
 - 3. Do not subject existing systems to excess pressures.

- C. Alarm Tests:
 - 1. Demonstrate activation of alarms and operational trip test and water delivery time for dry systems by use of Inspector's test valve.

3.4 SYSTEM TURNOVER

- A. Prior to final acceptance, instruct the Owner's Representative in the proper operation, maintenance, testing, inspection and emergency procedures for all systems furnished, for a period of time as needed. Provide one (1) new original pamphlet of NFPA 25. Indicate in writing to the Owner's Representative the provisions for proper maintenance, testing, and inspection of the systems as required by local fire codes.

END OF SECTION 211300

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required for Contract Documents.
- B. The basis of design shall be for FM-200 clean agent fire suppression systems.
- C. All penetrations through the walls, floor and ceiling of the space(s) protected by clean agent shall be sealed airtight. Visually inspect entire enclosure of protected space(s) to confirm penetrations have been sealed prior to the door fan test. Coordinate with other trades as required.
- D. Coordinate interlocks for damper closure and equipment shutdown with other trades.

1.3 QUALITY ASSURANCE

- A. Comply with the 2015 International Code referenced edition of the following National Fire Protection Association (NFPA) Standards:
 - 1. NFPA 2001: Clean Agent Fire Extinguishing Systems.
 - 2. NFPA 70: National Electrical Code.
 - 3. NFPA 72A: National Fire Alarm Code.
 - 4. NFPA 75: Protection of Information Technology Equipment.
 - 5. NFPA 76: Protection of Telecommunications Facilities.
- B. Follow requirements, recommendations and appendices to comply with the latest edition of the following publications, codes, standards and listings/approvals.
 - 1. Factory Mutual Engineering Corporation (FM) Approval Guide with Supplements and Loss Prevention Data Sheets.
 - 2. Underwriters Laboratories, Inc. (UL) Fire Protection Equipment Directory with Supplement.
 - 3. 2015 International Fire Code.
 - 4. OSHA Rules and Regulations.
 - 5. All requirements of Insurance Underwriter and other Authorities Having Jurisdiction.
- C. All systems and equipment, devices, hangers, and components shall be UL listed **and** FM approved and labeled for the intended fire protection service.

- D. The fire protection work shall be performed by a manufacturer's certified, factory trained and experienced firm regularly engaged in the installation of clean agent fire suppression systems.
- E. Preparation of working plans, calculations and site observation of system(s) shall be completed by a NICET Level III technician under the direction of a qualified State of Oklahoma Registered Professional Engineer.
- F. The installing Contractor shall provide certifications of his capability to recharge the system within 24 hours after discharge.

1.4 SYSTEM DESCRIPTION AND OPERATION

- A. The systems shall be total flooding clean agent extinguishing systems designed to provide a uniform concentration as required by manufacturer for the specific hazard at normal average ambient temperature.
 - 1. The amount of clean agent to be provided for each zone shall be the amount required to obtain and hold the minimum uniform concentration for ten (10) minutes. The Contractor shall take into consideration such factors as unclosable openings (if any), run-down time of fans, time required for dampers to close (and requirements for any additional dampers), and any other feature of the facility that could affect concentration.
- B. The systems shall be actuated by combination of ionization and photoelectric smoke detectors. Automatic operations in the protected area shall be as follows:
 - 1. Actuation of one (1) detector in either loop shall:
 - a. Illuminate the respective zone circuit lamp on the control unit.
 - b. Energize a pre-alarm audible or audible/visual signal associated with that area in which the detector was operated.
 - c. Actuate door closer/holders on access doors to the protected area.
 - d. Transmit a signal to the building's fire alarm system.
 - 2. Actuation of a second detector in the same area, but on the second detection loop shall:
 - a. Illuminate the respective zone circuit lamp on the control unit.
 - b. Energize an evacuation audible/visual signal associated with the area in which the detector was operated.
 - c. Start time-delay sequence.
 - d. Shut down ventilation system and close dampers.
 - 3. Discharge of the agent shall occur at the end of time-delay period. Upon discharge of the agent, all power to high-voltage shall be interrupted.
- C. The systems shall be capable of being actuated by manual discharge stations located at each fire exit. Operation of manual discharge station shall duplicate the cross-zones sequence description above, except that time-delay shall be bypassed. The manual

discharge station shall be of the electrical actuation type and be supervised at the control panel. Local, manual, mechanical release shall be installed on each pilot cylinder. Systems that do not allow for this type of releasing shall not be permitted.

1.5 SUBMITTALS

A. Product Data:

1. Submit manufacturer's catalog cut, specifications and installation manuals and instructions for each system and component of fire protection system. Clearly indicate pertinent information such as, but not limited to, the following:
 - a. Agent specifications.
 - b. Manufacturer, model number.
 - c. Materials, size and type connection.
 - d. System protection coverage limitations and piping arrangements per manufacturer's installation manual.
 - e. Wiring diagrams and schematics, sequences of operation and connection diagrams.
 - f. Calculations to demonstrate volumetric concentrations.

B. Submit manufacturer's certificate stating Contractor's qualifications and training.

C. Drawings and Calculations:

1. All drawings and calculations shall be stamped and signed by a State of Oklahoma registered Professional Engineer.
2. Submit electrical wiring diagrams and drawings showing layout of components to the Owner's Representative, Insurance Underwriter, and other Authorities Having Jurisdiction.

D. Record Drawings and Documents:

1. Submit Record Drawings, Installation and Maintenance Manuals, and Test Reports to the Owner's Representative.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Mixing of manufacturers or models of the same or similar component and systems will not be acceptable.
- B. Materials and equipment shall be standard products of the manufacturer's latest design and suitable to perform the functions intended. When one or more pieces of equipment must perform the same functions, they shall be duplicates produced by one manufacturer. The name of the manufacturer and the serial numbers shall appear on all major components. Locks for all cabinets shall be keyed alike.

- C. All devices and equipment shall be UL listed or FM approved.

2.2 CLEAN AGENT

- A. FM-200:
 - 1. The system shall provide the FM-200 minimum design concentration of 7.2% by volume or as required by the manufacturer for Class A hazards, in all protected spaces, at the minimum anticipated temperature within the protected areas. System design shall not exceed 9% for normally occupied spaces, adjusted for maximum space temperature anticipated, with provisions for room evacuation before agent release.
 - 2. Clean Agent shall have an ozone depletion potential of 0.0, a global warming potential of 3500 and a "No Observable Adverse Effect Level" (NOAEL) of 9%.

2.3 CONTROL PANEL

- A. The control panel shall perform the functions necessary to operate the Detection and Suppression System. The control unit shall be approved by UL and Factory Mutual as clean agent system control and releasing panel and shall be Fike Cheetah Xi or approved equal.
 - 1. The panel shall be capable of controlling up to eight (8) zones.
 - 2. The control unit shall be housed in a finished, fully recessed, painted wall mounted, sheet metal enclosure suitable for protecting electrical circuits. It shall be a NEMA Type 2 metal cabinet with hinged, locked doors.
 - 3. The control unit shall operate on 120 volts AC. Power consumption shall be 10 watts steady state with a peak requirement of 200 watts.
 - 4. In the event of a loss of rectified power, visual and audible trouble signs shall be activated.
 - 5. The control unit shall contain a self-contained, 24 volts DC emergency power supply. The units shall have built-in rechargeable standby batteries to provide a minimum 24 hour emergency power. A trouble signal will be initiated if battery leads are disconnected or the battery is in an abnormally low state of charge.

2.4 MANUAL DISCHARGE STATIONS

- A. Manual discharge stations shall be of the dual-action type that will require that an outer door be lifted to expose the actuation door. The concealed release switch shall be double action SPST. The front shall be suitably labeled. Pushbutton type manual discharge stations shall not be permitted.
 - 1. Manual actuation shall bypass the delay and abort functions and shall cause all alarm and shutdown devices to operate the same as if the system had operated automatically.

2.5 ABORT STATIONS

- A. Abort stations shall be UL listed, configured for flush mounting with one (1) normally open contact, large yellow pushbutton switch and stainless steel faceplate complete with operating instructions.
 - 1. The abort stations shall be Fike P/N 10-1639 or equal in quality, performance and features.

2.6 DETECTORS

- A. The detectors shall be spaced, located, etc., in accordance with the manufacturer's specifications and within the guidelines of NFPA Standard 72E.
 - 1. The ionization products-of-combustion smoke detectors shall be Fike 67-033 or equal in quality, performance and features.
 - 2. The photoelectric smoke detector shall be Fike 63-1052, or equal in quality, performance and features.

2.7 ALARM SIGNALS

- A. Alarm signals shall be operated from the control unit.
 - 1. The alarm horns shall be Fike P/N 20-130-117 or equal in quality, performance and features as specified herein.
 - 2. Visual alarm unit shall be vertical strobe unit, Fike P/N 02-10313 or equal in quality.

PART 3 - EXECUTION

3.1 SYSTEM INSTALLATION

- A. The entire installation shall comply with the requirements of NFPA 2001, NFPA 75, NFPA 76 and the manufacturer's recommendations.
- B. Clean agent extinguishing systems shall be designed to protect both below the raised floors and above. The appropriate portions of the ductwork serving the protected space shall be included in the system volume calculation.
- C. The Contractor is responsible for verification of final, actual agent quantities required.
- D. All penetrations through construction boundaries of areas protected by the clean agent system shall be sealed gas-tight by the Contractor responsible for the penetrations prior to fire suppression system acceptance test. Coordinate with all affected trades. If the system does not pass the test, reseal penetrations and retest until system passes. Contractor(s) responsible for leaking penetration(s) shall bear any costs associated with retesting of the fire suppression system.

- E. This Contractor shall provide all necessary conduit and wire between the suppression system control panel and the detectors, manual discharge stations, abort stations, alarm signals and any other appurtenances required to make a complete system. Power wiring to the suppression system control panel and fire alarm signals from the panel to the building fire alarm system will be provided by the Division 26 Contractor.

3.2 TESTING

- A. Piping shall be pneumatically tested in a closed circuit for ten (10) minutes at 40 psi. At the end of the test, the pressure drop shall not exceed 20% of the starting test pressure.
- B. Each zone shall be door fan tested to demonstrate the ability to maintain the minimum required agent concentration for no less than ten (10) minutes. Retest each zone as necessary until ten (10) minute hold time is achieved. The Contractor shall provide any materials and labor required to conduct all necessary tests as required by these Specifications and NFPA 2001.
- C. Demonstrate the proper sequence of operations including all alarms, pre-alarms, etc.
- D. Provide three (3) copies of all test reports to the Owner's Representative.

3.3 START-UP

- A. Provide a trained factory-representative's services for proper start-up and commissioning of the system.
- B. Conduct training sessions for Owner's Representatives demonstrating proper system operation and maintenance. The manufacturer's representative shall be on site for a minimum of eight (8) hours to provide training.

END OF SECTION 212200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City of Schenectady prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. Building Code of Oklahoma State.
 - 2. Mechanical Code of Oklahoma State.

3. Plumbing Code of Oklahoma State.
4. Fuel Gas Code of Oklahoma State.
5. Fire Code of Oklahoma State.
6. Energy Conservation Construction Code of Oklahoma State.
7. Oklahoma State Department of Labor Rules and Regulations.
8. Oklahoma State Department of Health.
9. National Electrical Code (NEC).
10. Occupational Safety and Health Administration (OSHA).
11. Local Codes and Ordinances.
12. Life Safety Codes, NFPA 101.
13. City of Schenectady Plumbing Department.
14. Oklahoma State Education Department Manual of Planning Standards.
15. ASPE/ANSI 45-2013: Siphonic Roof Drainage.

1.6 GLOSSARY

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|--------|---|
| ACI | American Concrete Institute |
| AGA | American Gas Association |
| AGCA | Associated General Contractors of America, Inc. |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AFBMA | Anti-Friction Bearing Manufacturer's Association |
| AMCA | Air Moving and Conditioning Association, Inc. |
| ANSI | American National Standards Institute |
| ARI | Air Conditioning and Refrigeration Institute |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. |
| ASME | American Society of Mechanical Engineers |
| ASPE | American Society of Plumbing Engineers |
| ASTM | American Society for Testing Materials |
| AWSC | American Welding Society Code |
| AWWA | American Water Works Association |
| FM | Factory Mutual Insurance Company |
| IBR | Institute of Boiler & Radiation Manufacturers |
| IEEE | Institute of Electrical and Electronics Engineers |
| IRI | Industrial Risk Insurers |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturer's Association |
| NESC | National Electrical Safety Code |

| | |
|----------|---|
| NFPA | National Fire Protection Association |
| OK/DEQ | Oklahoma State Department of Environmental Quality |
| SBI | Steel Boiler Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| UFPO | Underground Facilities Protective Organization |
| UL | Underwriter's Laboratories, Inc. |
| OSHA | Occupational Safety and Health Administration |
| XL - GAP | XL Global Asset Protection Services |

1.7 DEFINITIONS

| | |
|---|---|
| Acceptance | Owner acceptance of the project from Contractor upon certification by Owner's Representative. |
| As Specified | Materials, equipment including the execution specified/shown in the contract documents. |
| Basis of Design | Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.) |
| Code Requirements | Minimum requirements. |
| Concealed | Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade. |
| Coordination Drawings | Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended. |
| Delegated-Design Services | (Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations. |
| Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required | Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer. |
| Exposed | Work not identified as concealed. |

| | |
|--------------------------------|---|
| Extract | Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications. |
| Furnish | Purchase and deliver to job site, location as directed by the Owner's Representative. |
| Inspection | Visual observations by Owner's site Representative. |
| Install | Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional. |
| Labeled | Refers to classification by a standards agency. |
| Manufacturers | Refer to the article, Equipment Arrangements, and the article, Substitutions. |
| Prime Professional | Architect or Engineer having a contract directly with the Owner for professional services. |
| Product Data | Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work. |
| Provide (Furnish and Install) | Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated. |
| Relocate | Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use. |
| Remove | Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner. |
| Review and Reviewed | Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. |
| Roughing | Pipe, duct, conduit, equipment layout and installation. |
| Samples | Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged. |
| Satisfactory | As specified in contract documents. |
| Shop Drawings | Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work. |
| Site Representative | Owner's Inspector or "Clerk of Works" at the work site. |
| Submittals Defined (Technical) | Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents. |

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.
- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.
- C. Refer to Section 013300 - Submittal Procedures for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 UTILITY COMPANY SERVICES

- A. Plumbing Contractor shall make arrangements with utility for gas service to the Owner's distribution system. Provide service to the building as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the gas service shall comply with the published Utility Company standards. **PAY ALL UTILITY COMPANY CHARGES; INCLUDE CHARGES IN THE BASE BID.**

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 COORDINATION SHOP DRAWINGS

- A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
1. Siphonic roof drainage is an engineered system, and priority must be given to the location and elevation of all siphonic roof drainage piping.
 2. The HVAC Contractor shall prepare the base plan coordination drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be redrawn.
 3. The HVAC Contractor shall provide reproducibles and/or prints and submit the base plan to all Contractors. Electronic drawing files may be furnished to the contractors which have the CAD capabilities required for their use.
 4. The Plumbing/Fire Protection Contractor shall draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
 5. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
 6. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.

7. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
 8. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.
- B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
 2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment

or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.17 PAINING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Refer to Division 9 - Finishes, for additional information.

1.18 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.19 CHASES

- A. New Construction:
 - 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
 - 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.

3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.20 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.21 NON-RATED WALL PENETRATIONS

- ##### A.
- Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.22 PENETRATION FIRE STOPPING

- A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 ACCESS PANELS

- A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.25 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.26 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Install controls and devices furnished by others.
- C. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- D. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.27 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.28 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016000 - Product Requirements for additional information.

1.29 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.30 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing and Electrical Trades add contract items to the chart provided by the Heating Trade or provide separate charts.

1.31 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.32 OPERATION AND MAINTENANCE MANUALS

- A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.
- B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.33 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.34 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.35 TEMPORARY HEAT

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary

1.36 TEMPORARY FACILITIES

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.37 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.38 SYSTEM START-UP AND TESTING

- A. All new heating and ventilating systems shall be started up and operated at normal operating temperature for a period of 24 hours to "bake-off" the equipment. The associated ventilation system shall run on 100% outside air during the bake-off for an additional eight hours to purge the building. This work shall be completed prior to occupancy or on a Saturday, with the Contractor responsible for being on site during the entire purge and bake-off operation.

1.39 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a \$50.00 charge per drawing file and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
 2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.40 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 260500

PART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Provide interior and exterior lighting systems, including luminaires, hangers, supports, fittings, lamps, wiring, connections and controls, as indicated in the Contract Documents for complete and operational systems. The lighting layouts on the drawings are diagrammatic only. Refer to architectural "Reflected Ceiling Plans" for exact location of interior luminaires. Luminaires, in general, have been specified for the particular type of ceiling in which they are to be installed. Verify the ceiling construction details and provide luminaires suitable for the respective ceiling types and room finish schedule.

1.3 QUALITY ASSURANCE

- A. All luminaires shall be new and bear a NRTL label for the service intended. Luminaires shall be standard products of manufacturers regularly engaged in the manufacture of the specific type light luminaires specified and shall be the manufacturer's latest standard design that complies with specification requirements. Manufacturer's luminaire catalog numbers as indicated on the "Luminaire Schedule" indicate quality, type, and style but may not cover required special design details. Provide luminaires having such special details as noted in the "Luminaire Schedule", as indicated by the specified luminaire model number, and as required for proper installation. Verify the availability of all luminaires proposed to be used in the execution of the work prior to submitting same for approval. The discontinuance of production of any luminaire after such approval has been granted shall not relieve the Contractor from furnishing an approved luminaire of comparable quality and design at no additional cost. Luminaires shall be as specified in the "Luminaire Schedule". Luminaire types, appearance, characteristics, photometrics, finishes, etc. correspond to the specified manufacturer and associated catalog number listed in the "Luminaire Schedule". Products of other listed acceptable manufacturers shall be equivalent in every way to that of the luminaire specified. The Engineer reserves the right to disapprove any luminaire type submitted which he feels is not equal in quality, appearance or performance to the luminaire specified.
- B. Should there be any difference between drawings and schedules, secure from Architect/Engineer such information as is necessary before tendering his proposal. When finishes are not definitely specified, they shall be as selected by the Architect.
- C. Locations indicated for luminaires are approximate. Field coordinate exact locations as near as possible to the location indicated. Coordinate with the Engineer for any major location changes.

1.4 SUBMITTALS

- A. Submit shop drawings as described in Section 260500. Luminaire shop drawings shall include photometric data for each luminaire utilizing the specified lens/louver type, lamp(s) and ballast(s). All luminaire types for the project shall be submitted in a single complete package which shall be in the form of a soft cover binder with each luminaire separated by an identified index tab. Information on each luminaire shall include:
1. Manufacturer and catalog number.
 2. Dimensioned construction drawing(s).
 3. Complete catalog "cut" sheet.
 4. Photometrics (space to mounting height ratio, coefficient of utilization complete values, IES distribution hard copy (electronic shall be available upon request), candlepower distribution by angle and luminaire efficiency).
 5. Lens/louver type.
 6. Reflector information (type, material, reflectance, etc).
 7. Ballast with each type luminaire as applicable (type, sound rating, overload protection, voltage, input/fixture wattage, ballast factor, power factor, etc.).
 8. Materials for all components.
 9. Socket type.
 10. Lamp (rated life, initial lumen output, mean lumen output, Kelvin color, color rendering index, dimensions, wattage, socket type, mercury content).
 11. Certification of IES LM-79 an IES LM-80 testing for LED luminaires.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Luminaires and equipment shall be delivered with NRTL and manufacturer's labels intact and legible. Broken, cracked and damaged materials and equipment shall be removed from the site immediately and be replaced with new materials and equipment. Luminaires and accessories shall be stored in protected dry locations in their original unbroken package or container. Luminaires shall be protected from dust and dampness both before and after installation. Luminaires shall be protected from paint and cleaning solvents during all phases of construction.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Luminaires shall be identical in construction features, options, performance and appearance to the luminaires specified in the Luminaire Schedule. Luminaires and all components shall be suitable and rated for the intended use and location.
1. Lamps:
 - a. Lamps shall be suitable for the intended luminaire and meet the luminaire requirements and ratings.
 - b. Incandescent:
 - 1) Shall be inside frosted, fully rated for 130 volt operation.

- 2) Minimum efficacy shall be per Energy Policy Act requirements.
- 3) Halogen shall be 2500 hour rated and if possible in the lamp type infrared.

c. Fluorescent:

- 1) General: Lamps shall have 3500 degree Kelvin color and minimum starting temperature of 0°F. Low mercury (less than 4 milligrams of mercury per lamp).
- 2) Linear lamps shall at a minimum have a CRI of 82, 65 lumens per watt and 30,000 hour rated life at three (3) hours per start.
- 3) T8 4 ft. lamps shall at a minimum have a CRI of 85, 36,000 hour rated life at three (3) hours per start and 3100 initial lumen output/32 watt at 77°F.
- 4) T5 4 ft. lamps shall at a minimum have a CRI of 85, 20,000 hour rated life at three (3) hour starts and 2700 initial lumen output/28 watt at 77°F.
- 5) T5 HO 4 ft. lamps shall at a minimum have a CRI of 85, 25,000 hour rated life at three (3) hour starts and 4,400 initial lumen output/54 watt at 77°F.
- 6) Compact fluorescent lamps shall be four-pin, replaceable, minimum rated life of 10,000 hours, 58 initial lumens per watt and a minimum CRI of 82.
- 7) Compact fluorescent self-ballasted type shall be medium base screw in, with a CRI of 82, 10,000 hour rated life, 40 initial lumens per watt including the ballast and 0.5 power factor minimum.
- 8) All low temperature fluorescent lamps shall be rated by the manufacturer to start in the climate in which they shall be installed.

d. Metal halide lamps shall be phosphor coated or clear as called for by the luminaire design, and suitable for the burning position dictated by the luminaire. All metal halide lamps shall be of the safety type which automatically de-energize if the glass envelope is broken. If safety-type lamps are not available in sizes specified, lighting fixtures shall be provided with tempered glass lens to prevent escape of ultraviolet radiation and broken glass if lamp envelope is broken.

e. High pressure sodium lamps shall be phosphor coated or clear as called for by the luminaire design and suitable for the burning position dictated by the luminaire.

f. Acceptable manufacturers:

- 1) General Electric
- 2) Osram/Sylvania
- 3) Phillips

B. LED luminaires shall be identical in construction features, options and appearance to the luminaries specified in the Luminaire Schedule. LED luminaires include white and RGB systems, respectively.

1. LED luminaries shall be provided with all cables, controllers, power supplies, connectors, terminators and accessories required for a complete installation. LED system shall utilize pulse-width modulation, non-linear scaling techniques and reverse polarity protection for high-resolution output.
2. RGB LED systems shall be capable of at least 8-bit control of red, green and blue module. RGB LED system shall be capable of setting each module with a unique and individual address. Each address shall be controlled independently by DMX or alternate method protocol. All RGB LED fixtures shall undergo a minimum of eight (8) hour burn-in testing during manufacturing.
3. LED luminaries shall be high brightness and binned for forward voltage, luminous flux and wavelength.
4. LED luminaires shall be tested in accordance with IESNA LM-79 (luminous output, power input, luminaire efficacy (lumens/watt), color temperature and color rendering index) and IESNA LM-80 (output luminous maintenance, 10,000 hour minimum test). Luminaire output shall be a minimum of 60 lumens/watt. Rated life shall be a minimum of 50,000 hours at 50% output. Testing shall be performed by a US Department of Energy (DOE) accredited laboratory.
5. LED drivers shall be solid state Class 1 power supply/driver. The system shall have a minimum 90% power factor and a maximum of 30% THD, and heat sensing with color sensing feedback. Adequate heat-sink capability shall be provided to ensure the rated life.
6. The luminaire (to include LED lamps and LED drivers) shall have a full five (5) year minimum warranty for replacement and labor.
 - a. Acceptable LED Node Manufacturers:
 - 1) Philips
 - 2) Osram
 - 3) Cree
 - 4) Nichea
 - 5) Lumiled

C. Ballasts:

1. Ballasts shall be designed for continuous operation within the luminaire provided and utilizing the lamp(s) specified without overheating or causing any other detrimental affects. Ballasts shall be quiet in operation and of the lowest noise level available. Luminaires shall in no way amplify ballast noise but rather shall suppress ballast noise. Ballasts considered to have objectionable hum or noise shall be replaced immediately at no additional cost.
2. Fluorescent ballasts shall conform to UL and ANSI standards and shall display symbols of approval by the NRTL and of certification by the C.B.M. The component parts of the ballast shall be designed, fabricated, and assembled in accordance with the latest NEMA requirements. Ballasts shall be marked "Class P" indicating approved integral ballast protection. Fluorescent ballasts not "P" rated shall be individually fused at the ballast; fuses shall be cartridge type, sized as recommended by the manufacturer. Ballasts shall have 0.95 power factor minimum, starting temperature of 0°F or less and a crest factor of 1.7 or less. Luminaires with two (2) lamps or multiples of two shall have two-lamp ballasts. Three-lamp ballasts shall not be used unless specified in the Luminaire Schedule. Ballasts for compact fluorescent lamps shall be electronic type.

- a. Electronic Ballasts: Operating temperature shall not exceed 25°C temperature rise over 40°C ambient. Sound rating shall be "A+" with sound levels less than 18 dBA. Maximum input wattage at stabilized temperatures shall be 89 watts for three-lamp ballast, 60 watts for two-lamp ballast, or 30 watts for one-lamp ballast, when using 32 watt T-8 lamps. Ballasts shall comply with FCC Rules and Regulation for EMI and RFI, applicable ANSI Standards on harmonic distortion, surge protection, etc., IEEE Publication 587, Category A for line transients. Lamps shall operate at a frequency of 20 to 35 kHz with no detectable flicker. Ballast shall be dual rated 120/277V. Maintain a constant light output at an input voltage of $\pm 20\%$ of rated voltage. Average lamp current crest factor not to exceed 1.4. Total harmonic distortion (THD) shall not exceed 10%. Ballast types shall be as listed below and as specified in the Luminaire Schedule.

1) Instant Start Ballasts:

- a) Ballasts shall operate without preheating of the lamp electrode and shall start lamps without delay upon activation of power.
- b) Ballasts shall provide high initial starting voltage to facilitate discharge between lamp electrodes.
- c) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one (1) lamp fails.
- d) Ballasts shall restart replacement lamps without needing the power to the ballasts to be cycled.
- e) Provide ballasts with ballast factor in the range of 0.8 to 1.15 as specified on Luminaire Schedule or 0.88 if not indicated.
- f) Provide NEMA Premium, CEE qualified ballasts.

2) Rapid Start Ballasts:

- a) Ballasts shall provide a low-voltage to lamp electrodes prior to starting in order to preheat the electrodes and allow a lower starting voltage than instant start ballasts.
- b) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one (1) lamp fails.
- c) Provide ballasts with ballast factor of 0.77 to 1.15 as specified on Luminaire Schedule or 0.89 if not indicated.

3) Programmed Start Ballasts:

- a) Ballasts shall provide optimal lamp electrode current to preheat electrodes, maximize lamp life in frequent switching applications and minimize required preheat time.
- b) Ballasts shall be wired with lamps in parallel to allow additional lamps to remain lit if one (1) lamp fails.
- c) Ballasts shall restart replacement lamps without needing the power to the ballasts to be cycled.

- d) Provide ballasts with ballast factor of 0.6 to 1.15 as specified on the Luminaire Schedule or 0.89 if not indicated.
 - e) Provide NEMA Premium, CEE qualified ballasts as indicated in the Contract Documents.
- 4) Design Make Manufacturers:
- a) Advance
 - b) General Electric
 - c) Osram Sylvania
 - d) Universal
- b. Unless otherwise noted, Thermal Magnetic Ballasts shall not be used for any linear fluorescent lighting.
- c. Electronic Lighting Management Dimming Ballasts:
- 1) Electronic Lighting Management Dimming Ballasts shall be Lutron "ECO-10" ECO and TVE Series or approved equal.
 - 2) Contractor shall take sole responsibility for compatibility of electronic dimming ballast and dimming controls.
 - 3) Three-wire or 0-10V dimming as specified on drawings or Luminaire Schedule.
 - 4) Electronic Dimming Ballast manufacturer shall provide single, two-lamp and three-lamp electronic dimming ballasts for T-5, T-8 and compact lamps.
 - 5) Ballast manufacturer shall functionally test each electronic dimming ballast at the low, medium and high end of the dimming range.
 - 6) Dimming range of electronic dimming ballasts shall be from 100% to 10% for T-8 lamps, 100% to 5% for T-5 and T-4 lamps.
 - 7) Electronic dimming ballasts shall not be damaged by any of the following miswires:
 - a) Line voltage and control wire inputs.
 - b) Any lamp wire to any other lamp wire.
 - 8) Electronic dimming ballasts shall withstand 4000 volt surges as specified in ANSI C62.4.
 - 9) Electronic dimming ballast shall preheat lamp cathodes before applying arc voltage to ensure rated lamp life is not diminished.
 - 10) Electronic dimming ballast shall have:
 - a) A power factor greater than .95.
 - b) A ballast factor equal to .93 unless otherwise noted.
 - c) Throughout the entire dimming range, magnitude of harmonic distortion current shall not exceed 10% of the total input current at full light output.
 - d) Lamp current crest factor less than or equal to 1.6.
 - 11) Electronic dimming ballasts shall be UL listed and Class P thermally protected.

- 12) Ballasts shall withstand changes in line voltage and frequency with virtually no change in light output.
 - 13) Provide NEMA Premium, CEE qualified ballasts.
3. High intensity discharge ballasts shall be constant wattage type, have power factor of not less than 90%, be NRTL tested and have CBM label. Sound rating shall be "B" with sound levels less than 30 dBA, where ballasts are used in indoor luminaires in occupied areas. Ballasts shall be encased and potted. Starting current shall not exceed operating current. Ballast shall maintain lamp operation for voltage fluctuations of $\pm 10\%$ of rated voltage. The voltage rating of each ballast shall correspond to the voltage of the circuit to which the ballast will be connected. Ballasts for exterior luminaires shall be rated for operation at ambient temperatures to -20°F . All ballasts shall have a two (2) year material and labor guarantee.

D. Lenses:

1. Shall be listed materials tested in accordance with ASTM D-635, "Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position" and burns less than 2/5 inches per minute.
2. The products shall have a smoke density of less than 75 when tested in accordance with ASTM D-2843, standard test method for "Density of Smoke from the Burning or Decomposition of Plastics".
3. The flame spread rating shall not exceed 0-25, and smoke developed rating shall not exceed 450 in accordance with ASTM E-84, standard test method for "Surface Burning Characteristics of Building Materials".
4. Self-ignition shall not occur below 600°F in accordance with ASTM D-1929, standard test method for "Ignition Properties of Plastics".
5. Materials shall remain in place 15 minutes at 175°F and fall from frame at 200 degrees below ignition temperature in accordance with ASTM D-648, "Deflection Temperature of Plastics Under Flexural Load".

E. Wiring:

1. Wiring within lighting fixture for connection to branch circuit shall be:
 - a. NEC Type AF for 120 volt, minimum #18 AWG.
 - b. NEC Type SF-2 for 277 volt, minimum #18 AWG.
2. Stranded wire within lighting fixture shall be lead dipped.

F. General:

1. Parabolic open cell luminaires shall have reflector channels for symmetrical distribution at all lamp operations. A minimum of two (2) channels shall be provided.

G. Sockets - Lampholders:

1. Lampholders shall be of porcelain or bakelite with a 660 watt, 660 volt rating. Lampholders approved for use may be the type providing for screw-type wire terminal connections or the type of socket provided with attached leads, or the

type permitting push-in locking connection of the ballast wiring. Makes: Bryant, Leviton or Kulka or approved equal. Sockets shall be attached to the socket bars by means of screw/nut arrangement or any other approved means that will insure solid mounting and support of the lampholders. Lampholders shall be of the pressure lock or push-in-and-hold type and shall be UL listed.

H. Exit Luminaires:

1. Refer to Luminaire Schedule.

I. Luminaire Schedule:

1. Luminaire schedule is found on Contract Drawings.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION

- A. Provide for every luminaire shown on the plans, as scheduled on the drawings.
- B. Where a luminaire is specified or approved for certain locations, all luminaires in those locations must be of the same manufacturer and style. All luminaires shall be NRTL tested.
- C. Obtain exact location of all ceiling and wall-mounted luminaires from the Architect/Engineer.
- D. Luminaire fasteners or hangers shall be capable of supporting four (4) times the luminaire weight.
- E. Luminaires shall be supported independent from ceiling system or other building services. Support luminaires at two (2) locations using #10 steel wire similar to that used to support the ceiling grid. Directly attach steel wire to structural member.
- F. Mount luminaires in true vertical and horizontal alignment. Offset luminaires as required to avoid obstructions. Provide all necessary hangers and supports for proper luminaire installation. Such supports shall be anchored to channels in the ceiling construction, to the structural slab, or to structural members above the suspended ceiling.
- G. Provide all necessary accessories for "end-to-end" mounting where continuous rows of fluorescent luminaires are indicated. All luminaire assemblies shall be grounded.
- H. New luminaires may be provided to replace existing luminaires scheduled to remain or be reused, subject to shop drawing approval.

3.2 SURFACE CEILING MOUNTING

- A. Mount surface luminaires tight to surface in a manner such that mounting surface does not distort fixture.

- B. Luminaires installed in continuous rows may be fed by a single outlet if fixtures are UL approved and suitable for through wiring in luminaire raceway.
- C. Luminaire fasteners or hangers shall be capable of supporting four (4) times luminaire weight.
- D. Luminaires shall be supported independent from ceiling system or other building services.

3.3 RECESSED MOUNTING

- A. The Electrical Contractor shall verify ceiling type, construction, and material prior to placing an order for recessed luminaires.
- B. The Electrical Contractor shall furnish fixtures with an IC rating for all recessed incandescent fixtures installed in direct contact with insulation.
- C. The Electrical Contractor shall furnish and install plaster frames for plaster ceilings and flanged frames for drywall ceilings.
- D. The Electrical Contractor shall furnish and install all required mounting hardware and accessories to adapt fixtures to ceiling construction.
- E. Lay-in type luminaires shall be supported independent of the ceiling system at each end of the luminaire with galvanized support wire.
- F. Provide and install seismic hold-down clips for all lay-in type lighting fixtures.

3.4 PENDANT MOUNTING

- A. Mount pendant-mounted luminaires from 1/4 in. threaded rods of required length.
- B. Sleeve threaded rods with 1/2 in. EMT painted with color as directed by Architect/Engineer.
- C. Luminaires installed in continuous rows may be fed by a single outlet if they are UL approved and suitable for through wiring in luminaire raceway.

3.5 REMOTE BALLASTS

- A. Remote ballasts shall be mounted in an approved NEMA 1 enclosure. Remote ballasts shall be located in areas easily accessible to maintenance personnel.
- B. Wiring from luminaire to remote ballast shall not exceed the ballast manufacturer's recommendations for distance.
- C. Remote ballast shall be clearly labeled indicating fixture served, voltage, panelboard and circuit number served from.

3.6 AIRCRAFT CABLE SUSPENSION

- A. Cables shall be 1/16 in. aircraft cable with end safety fittings. Cable shall be provided with 2 in. diameter mini-canopy and threaded coupler for attachment to a 1/4 in.-20 threaded stud extending 3/4 in. below ceiling.
- B. Cable assembly shall include a spring-loaded adjustment device mounted in the fixture.
- C. The Contractor shall be responsible for providing required supports for cable attachment.
- D. For cord feed to the luminaire, provide continuous cord clip of matching color to attach the cord to the cable.
- E. Support per manufacturer's recommendations.

3.7 COVE LIGHTING

- A. Fluorescent cove lighting shall be installed so as to produce a continuous and unbroken band of light with no shadows or light gaps.
- B. A combination of 2 ft., 3 ft. and 4 ft. lamp fixtures may be required to accomplish a continuous band of light.

3.8 LAMPS

- A. Furnish and install required lamps in all luminaires. Any lamp which fails prior to project close-out shall be replaced at no additional cost.
- B. Replace any lamp or lamps whose color is determined to be unsatisfactory.

3.9 BALLASTS

- A. Furnish and install ballasts for all luminaires requiring ballasts.
- B. To facilitate multi-level lamp switching, lamps within fixture shall be wired with the outermost lamp at both sides of the fixture on the same ballast, the next inward pair on another ballast and so on to the innermost lamp (or pair of lamps). Within a given room, each switch shall uniformly control the same corresponding lamp (or lamp pairs) in all fixture units that are being controlled.
- C. Provide two-lamp ballasts for fixtures with two (2) fluorescent lamps or multiples of two lamps. On four-lamp luminaires, the two (2) outside lamps shall be on one (1) ballast and the two (2) inside lamps shall be on the other ballast.
- D. Where three-lamp luminaires are indicated, unless switching arrangements dictate otherwise, utilize a common two-lamp ballast to operate the center lamp in pairs of adjacent units that are mounted in a continuous row. The ballast luminaire and the slave-lamp luminaire shall be factory wired with leads or plug devices to facilitate this circuiting. Individually mounted luminaires and the odd fixture in a row shall utilize a single-lamp ballast for operation of the center lamp. Contractors shall verify lengths of factory wired leads.

- E. Dimming ballasts and lamps shall be burned in at full brightness for a minimum of 100 hours prior to being used for dimming. Keep a record of all rooms with dimming luminaires and when the lamps and ballasts were burned in. Submit this record with the lighting operation and maintenance manual.

3.10 GROUNDING

- A. Ground all non-current carrying parts of all lighting fixtures.
- B. All grounding shall be accomplished with NRTL tested grounding connectors suitable for this purpose.

3.11 LABELING

- A. Attach a self-adhesive red dot label, 1/2 in. in diameter, to all lighting fixtures with an integral battery back-up and/or those tied into an emergency generator. Labels shall be attached to these fixtures or to adjacent ceiling tiles so that they are readily discernible for testing and maintenance purposes.

3.12 FINAL CLEANING

- A. Immediately prior to acceptance, damp clean diffusers, glassware, luminaire trim, reflectors, lamps, louvers, lens and similar objects of all luminaires. Remove all dirt, corrosion, foreign material, finger marks, and blemishes. Replace all burned out lamps and failed components.

3.13 REMOVAL OF BALLASTS IN EXISTING LUMINAIRES

- A. Assume ballasts contain PCB material unless labeled otherwise or test samples show materials are not PCB; submit a test report. Remove all ballasts from existing luminaires indicated on the Contract Documents. Dispose of all ballasts which do not have non-PCB labels in PCB containers and pay all costs to have containers taken to EPA-approved incinerators and disposed of by EPA regulations. Follow all EPA regulations for transporting material. If ballast has leaked in existing luminaires, remove material deposited in luminaire and dispose of those materials as indicated above. Provide documentation verifying disposal of PCB-contaminated ballasts.

3.14 REMOVAL OF LAMPS IN EXISTING LUMINAIRES

- A. The Contractor shall employ the service of a certified disposal/recycling service company to dispose of all removed fluorescent and/or HID lamps. All disposal procedures shall be performed in accordance with EPA Requirements and Subtitle C for the disposal of mercury-contaminated lamps.

END OF SECTION 265000

SECTION 265516 THEATRICAL LIGHTING AND STAGE DIMMING SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services for the complete installation of theatrical lighting and stage dimming system and related Work required in these Contract Documents.

1.3 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be accordance with NFPA 70 (National Electrical Code), National Electrical Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA, UL and IEEE Standards.

1.4 SUBMITTALS

- A. Provide submittals for the entire system to comply with Specification Section 260500 and to include the following:
 - 1. Complete equipment list, including quantities.
 - 2. Catalog descriptive literature for equipment.
 - 3. One line diagram showing devices, wire quantities and sizes.

1.5 GENERAL DESCRIPTION

- A. The stage dimming system specified is based on equipment manufactured by Electronic Theater Controls Inc. (E.T.C.). All reference to model numbers and other pertinent information is intended to establish the standards of performance, quality and appearance, which must be met.
- B. The stage dimming system shall include all necessary equipment to perform the following functions:
 - 1. Control intensity of house lighting.
 - 2. Control intensity of stage lighting.
 - 3. Automatic circuit transfer during power failure.
 - 4. Panic stations and devices as indicated on the Drawings.
 - 5. Connector strips as indicated.
 - 6. Alternate source transfer system.
 - 7. All required control wiring.
 - 8. All theatrical fixtures and associated support hardware.
 - 9. Provide all power distribution equipment, feeders and branch circuit wiring.

1.6 WARRANTIES

- A. The manufacturer of the stage lighting and control equipment shall warranty the equipment to be free from defects of material or workmanship for a period of one year from the date of acceptance. During the period of this warranty, equipment, which proves to be defective, shall be repaired or replaced at no charge (excepting freight). Unauthorized local repairs of the equipment during the warranty period shall relieve the manufacturer of its responsibilities under this warranty.
- B. Certificate of Installation: The Contractor shall submit certificates from the manufacturer's field engineer stating the installed system is operating properly and complies with manufacturer's recommendations.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver stage lighting equipment and controls securely wrapped in factory fabricated wooden or fiberboard type containers.
- B. Handle equipment and controls carefully to prevent breakage, denting and scoring finish. Do not install damaged equipment and controls; replace and return damaged units to equipment manufacturer.
- C. Store stage lighting equipment and controls in clean dry spaces. Store in original cartons and protect from dirt, physical damage, weather and construction traffic.

PART 2 - PRODUCTS

2.1 INSTALLATION RACK(S)

A. General:

1. Up to 96 model configurations with standard features.
2. Rack shall be wall mounted through vibration isolators.
3. Welded 16 gauge, steel construction with fine textured, scratch resistant, gray epoxy paint. Shall have knockouts for feeder conduit entrance.
4. Easily removable air filter and high efficiency cooling system with airflow sensor. Shall have individual over temperature shutdown by dimmer module.
5. Module spaces shall be mechanically keyed to accept only the module type (20A, 50A or 100A) specified for that space. Racks that allow modules of varying wattages to plug into the same space shall not be acceptable.

B. Electronics:

1. Dimmer control electronics shall be contained in one plug-in Control Electronics Module (CEM). Each CEM shall contain no discrete wire connections, and be housed in a formed steel body with an injection-molded face panel. The CEM shall have three phase-status LED indicators. A 25-key control pad and a two-line-by-20-character backlit LCD (liquid crystal display) shall be provided for system configuration, testing and diagnostics. LCD shall also display rack status and error messages.
2. The CEM shall respond to control changes in less than 25 milliseconds. Dimmer outputs shall exhibit no oscillating or hunting for levels. Dimmers set to the same level shall output within $\pm 1V$ of each other, regardless of phase or electronic module control.
3. The CEM shall respond to control changes in less than 25 milliseconds. Dimmer outputs shall exhibit no oscillating or hunting for levels. Dimmers set to the same level shall output within $\pm 1V$ of each other, regardless of phase or electronic module control.
4. Dimmer output shall be regulated for incoming line voltages. The regulation shall adjust for both RMS voltage changes and deformations in the incoming AC wave form. The CEM shall monitor and adjust each dimmer's output to maintain a constant power to the load. Regulation shall maintain the desired output voltage $\pm 1V$ for the entire operating range (90-140V AC) with the exception that the maximum output will be no greater than the line voltage minus dimmer insulation loss. The regulation shall compensate for dips and anomalies in the AC wave form on a dimmer-by-dimmer basis. There shall be no interaction between dimmers in the system or any other equipment. The output shall be nominally regulated to 120V, but shall be field adjustable on a dimmer-by-dimmer basis to allow for varying cable length.
5. Two optically isolated DMX512 inputs shall be provided, allowing overlapping or separation of any control level. 2,500V of optical isolation shall be provided between the DMX512 inputs and the CEM. This shall protect the DMX512 inputs from a failed control module and the CEM from failed DMX512 inputs. Systems that do not have optical isolation on a prewired factory plug-in device shall not be acceptable.

6. The CEM shall be completely digital without employing any digital-to-analog demultiplexing schemes or analog ramping circuits. Each rack shall, in the event of signal loss, maintain the last level for a user-programmable time of zero to five minutes or indefinitely. Systems that do not offer this feature shall not be acceptable.
7. A system-wide panic circuit shall be provided. Any dimmer in any rack may be assigned to the panic circuit.
8. All system functions may be activated by the CEM's integral keypad and shall not require any remote unit. Systems that do not offer this feature shall not be acceptable.

C. ETCLink Network:

1. The ETCLink network shall provide remote monitoring, programming and backup functions for the system through any Sensor-compatible console, PC, or hand-held remote device. System information shall also be displayed on any system interface including the CEM and the devices listed above. Systems that do not provide both types of user interface shall not be acceptable.
2. ETCLink shall provide an integral link to connect all racks in the system for rack-to-rack communication. Information for all configuration and backup looks shall be stored in all CEM's to allow swapping of CEM's throughout the system. Systems not storing all configuration data and backup looks for each dimmer in all control modules shall not be acceptable.
3. A technician shall be able to program all parameters onsite, using a laptop personal computer. These parameters shall include, but not be limited to, defining rack type, module type, output voltage (boost) for each dimmer, firing mode, curve, dimmer numbering and DMX512 port assignments. Systems requiring factory programming shall not be acceptable.

2.2 DIMMER MODULES

A. General:

1. The dimmer modules shall be the Sensor dimmer modules as manufactured by Electronic Theatre Controls, Inc., or equal. Sensor dimmer modules shall be designed for dependable, economical service in theatrical and video applications.

B. Electrical:

1. Each dimmer shall provide, but not be limited to, the following:
 - a. Each dimmer module shall contain one or two single-pole circuit breakers, a solid state switching module, associated toroidal filters, and power and control connectors.
 - b. Modules shall not have any protruding pins subject to physical damage when the module is not installed.
 - c. Modules shall be keyed so that dimmer modules of different capacity shall not be interchangeable.

- d. Circuit breakers shall be fully magnetic so the trip current is not affected by ambient temperature. Circuit breakers shall be rated for tungsten loads having an inrush rating of no less than 20 times normal current. Circuit breakers shall be rated for 100 percent switching duty applications.

C. SCR Assembly:

- 1. Each dimmer module shall use a solid state module (SSM) consisting of two silicon-controlled rectifiers (SCRs) in an inverse parallel configuration, and all required gating circuitry on the high voltage side of an integral, opto-coupled control voltage isolator. Rectifiers, copper leads and a ceramic substrate shall be reflow soldered to an integral heat sink for maximum heat dissipation. The SSM shall also contain a control LED, a thermistor for temperature sensing, and silver-plated control and load contacts. The Advanced Features version of the SSM shall include an integral output LED, output voltage sensors and current sensors for feedback to the control module. The entire SSM shall be sealed in a plastic housing requiring only a screwdriver to replace. Dimmers employing triac power devices, pulse transformers, or other isolating devices not providing at least 2,500V RMS isolation, shall not be acceptable. Dimmer modules requiring disassembly, heat sink grease or additional tools for repair shall not be acceptable.
- 2. All electronic components (current/voltage sensors and indicators) shall be contained in a single, field-replaceable housing. Modules requiring discrete wiring of electronic components shall not be acceptable.
- 3. SCR power switching devices shall have the following minimum ratings:

| Module Size: | 20A | 50A | 100A |
|----------------------------------|------------|------------|-------------|
| Single cycle: Peak surge current | 625A | 1,200A | 2,300A |
| Half cycle: 12T | 1,620 | 4,150 | 22,000 |
| Transient over voltage | 600V | 600V | 600V |
| Die size (in) | .257 | .394 | .570 |

D. Filtering:

- 1. Dimmer modules shall include toroidal filters to reduce the rate of current rise time resulting from switching the SCRs. The filter shall limit objectionable harmonics, reduce lamp filament sing and limit radio frequency interference on line and load conductors. Modules shall be available in 500 ms. filter rise times. Rise time shall be measured at the worst case slew rate (about 50 percent) from 10 to 90 percent of the output waveform with the dimmer operating at full load.

E. Performance:

- 1. Power efficiency for standard dimmers shall be at least 97 percent at full load with a no-load loss of 3V RMS. The dimmer shall accept hot patching of a cold incandescent load up to the full rated capacity of the dimmer.

F. Physical:

1. Dimmer modules shall be fully plug-in and factory wired. Dimmer modules shall consist of a heavy duty, die-cast aluminum chassis with integral face panel. No tools shall be required for module removal and insertion. All parts shall be properly treated, primed and finished in fine-texture, scratch resistant, gray epoxy powder coat. With the exception of the circuit breaker, the module shall contain no moving parts. Each module shall be labeled with the manufacturer's name, catalog number and rating. Modules constructed of molded plastic for structural support are not equivalent and are not acceptable. Dimmer modules shall be UL Recognized.

2.3 ANALOG ADDRESS PROCESSOR UNITS

A. General:

1. Analog Address Processor Unit is designed as a stand-alone unit. The module is designed to support eight channels of analog control on a maximum of eight Analog Address slider stations. The unit shall output DMX512 through the processor unit from another control device for data merging.

B. Electrical:

1. The processor unit shall be a microprocessor-based, solid state device. The field programmable dimmer-to-channel assignments, panic and work light program shall be stored in nonvolatile EEROM. The DMX512 input shall be optically isolated. In the event of a failure in the Analog Address electronics, a bypass switch is provided for direct throughput of the DMX512 signal to the dimmers. An LCD display with control buttons shall be provided to program analog, panic and work light channel assignments, and to perform diagnostic tests. Wiring to the control stations shall be low voltage. Operating voltage (12V DC) shall be provided by the system power supply in the Analog Address processor unit.

C. Operating Functions:

1. Any dimmer in the system may be assigned to one of the eight analog control channels. Each analog channel may drive any number of dimmers in the system. Any dimmer in the system may be assigned to panic and work light channels. Assigning dimmers to analog channels and to panic/work light channels shall be completely programmable from the processor unit. The processor unit may be programmed to allow a DMX512 input device (remote control console) to provide levels to dimmers also assigned to analog channels. Dimmers shall respond to the highest level instruction. Otherwise, the analog channel has exclusive control over the dimmers assigned to it. Crossfade times shall be user selectable from 0:00 to 5:59 at the processor unit. To assist in troubleshooting, a test mode shall allow direct control of any system dimmer without analog control or DMX512 input.

D. Physical:

1. The processor unit shall be a self-contained assembly, provided with all terminals necessary for analog wiring and DMX512 input and pass through.

2.4 HOUSE LIGHTING CONTROL STATION

- A. Provide one (1) house light control station.
- B. Stations shall be similar to Stage Managers panel except with three (3) channel slider, master, take control and panic.

2.5 PANIC STATION

A. General:

1. Analog Address panic/work light stations shall be single push-button stations that force selected dimmers to full intensity, disregarding instructions from other control sources.

B. Electrical:

1. The single switch shall contain two integral LED indicators. When the panic/work light channel is active, the green indicator is illuminated; when it is inactive, the amber indicator is illuminated. Control station wiring shall be low voltage (Class 2). Panic/work light stations terminate at the processor unit, using four #18 AWG wires not longer than 500 ft. All wiring must be run in dedicated metal conduit. Contractor terminal strip with pressure connections shall be mounted on a printed circuit board. Operating voltage (12V DC) shall be provided by the system power supply installed in the processor unit.

C. Operating Functions:

1. When the switch is pushed at any panic/work light station, all specified dimmers are faded to full intensity in the fade time set at the processor unit, and the LED indicators on all stations change from amber to green. Once the panic/work light is on, pressing any switch will fade the panic/work light out and return dimmer control to the currently active station. All LED indicators immediately change from green to amber. Assignment of dimmers to panic/work light channels shall be programmable at any time from the processor unit. This information is stored in non-volatile EEROM.

D. Physical:

1. The station face panel shall be .080 in. sheet metal, finished in fine-texture, scratch-resistant, black powder coat. Silk screened graphics shall be white. Control station electronics shall mount directly to the faceplate. The assembly shall mount into a single gang back box (provided by contractor).

- E. Provide the following:
 - 1. Analog Address Panic Stations as shown on the drawings. ETC #U10001.

2.6 WIRING DEVICES (DISTRIBUTION EQUIPMENT)

A. Connector Strips:

- 1. Connector strips shall be fabricated from 16 gauge cold rolled steel, in 8'-0" sections. Devices shall be properly cleaned, primed and painted with fine-textured, scratch-resistant, black powder coat. Circuit numbers shall be 3/4 in. Lexan tags with white letters on black background.
- 2. Individual pigtails and outlets shall be evenly spaced, on connector strips. Where a circuit would fall on a joint it shall be moved 3 in. towards the junction box end of the strip.
- 3. Pigtails shall be three-wire type "SO" rubber jacketed cable sized for the circuit capacity. Connectors shall be as indicated on drawings. Internal wiring shall be sized to circuit capacity and terminated in feed through compression terminals at one end for ease of installation. Wire shall be rated at 125°.
- 4. Connector strips shall be supplied with appropriate hardware for mounting. Connector strips shall have double pipe brackets on 5 ft. centers.
- 5. Wiring devices shall be UL Laboratories Listed. Connectors shall be stage pin.
- 6. Connector strips shall have junction box with barrier strip termination.
- 7. Contractor to provide 2 in. fixture pipe.
- 8. Connector strip shall be as follows:
 - a. _____ ft. long.
 - b. Circuits as shown on drawings.
 - c. Two (2) DMX jacks on each strip.
 - d. Total of _____ strips.

B. Gridiron Junction Boxes:

- 1. Gridiron junction boxes shall be provided for the connector strips that are to be hung from the rigging.
- 2. Boxes shall have the number of circuits corresponding to the connector strips shown on the drawings.
- 3. Boxes shall be 16 gauge, UL listed, and contain barrier-strip terminations.

C. Flexible Multi-Conductor Cable and Accessories:

- 1. Provide flexible cable from the gridiron boxes to the connector strips.
- 2. Cable shall have sufficient conductors to match the appropriate connector strip. Separate neutrals are required.
- 3. Kellems grips sized for the cable shall be provided at the gridiron boxes and at the connector strip termination boxes.
- 4. One (1) cable cradle shall be provided with each cable.
- 5. One (1) cable clamp shall be provided with each cable to secure it to the connector strip pipe.

- D. Wall Plug Boxes and Cat Walk Plug Boxes:
1. Wall boxes shall be flush mounted where shown on the drawings.
 2. Cat walk boxes shall be surface with pipe mounting.
 3. Provide one (1) receptacle per circuit, quantity as shown on the drawings. Receptacles shall be stage pin in all locations except on the front of stage (3) where they shall be parallel blade.
 4. Boxes shall be 16 gauge. All receptacles shall be labeled with 1 in. circuit numbers.
 5. Boxes shall be finished same as connector strips.

PART 3 - EXECUTION

3.1 FIELD QUALITY AND CONTROL

- A. Installer must examine areas and conditions under which stage lighting and controls are to be installed and notify contractor in wiring of conditions detrimental to proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

3.2 INSTALLATION

- A. Install stage lighting and controls where shown, in accordance with manufacturer's written instructions and with recognized industry practice to ensure that stage lighting equipment complies with applicable requirements of NEC and UL standards and with the applicable portions of NECA's "Standard of Installation".
- B. Provide separate neutrals for all circuits.
- C. All light fixtures are to be installed. Contractor is to coordinate fixture locations with the Owner and Engineers.
- D. Provide recommended manufacturer's checks with megger. Submit test report for review and approval before initially energizing dimmer system.

3.3 ADJUST AND CLEAN

- A. Clean stage lighting equipment of dirt and debris upon completion of installation.
- B. Protect installed stage lighting equipment and lamps during remainder of construction period.

3.4 MANUFACTURER'S SERVICES

- A. The manufacturer of the dimming system shall arrange to have an engineering representative on the job after installation has been completed and prior to energization of the system to test and adjust the system and further, to instruct persons designated by the owner in the operation and maintenance of the system. Such engineering services shall be furnished within fourteen (14) days of written request by the Contractor.

END OF SECTION 265516

SECTION 270500

BASIC COMMUNICATIONS REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City of Schenectady prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. Building Code of Oklahoma State.
 - 2. Mechanical Code of Oklahoma State.

3. Plumbing Code of Oklahoma State.
4. Fuel Gas Code of Oklahoma State.
5. Fire Code of Oklahoma State.
6. Energy Conservation Construction Code of Oklahoma State.
7. Oklahoma State Department of Labor Rules and Regulations.
8. Oklahoma State Department of Health.
9. National Electrical Code (NEC).
10. Occupational Safety and Health Administration (OSHA).
11. Local Codes and Ordinances.
12. Life Safety Codes, NFPA 101.
13. City of Schenectady Plumbing Department.
14. Oklahoma State Education Department Manual of Planning Standards.
15. ASPE/ANSI 45-2013: Siphonic Roof Drainage.

1.6 GLOSSARY

| | |
|--------|---|
| ACI | American Concrete Institute |
| AGA | American Gas Association |
| AGCA | Associated General Contractors of America, Inc. |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AFBMA | Anti-Friction Bearing Manufacturer's Association |
| AMCA | Air Moving and Conditioning Association, Inc. |
| ANSI | American National Standards Institute |
| ARI | Air Conditioning and Refrigeration Institute |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. |
| ASME | American Society of Mechanical Engineers |
| ASPE | American Society of Plumbing Engineers |
| ASTM | American Society for Testing Materials |
| AWSC | American Welding Society Code |
| AWWA | American Water Works Association |
| FM | Factory Mutual Insurance Company |
| IBR | Institute of Boiler & Radiation Manufacturers |
| IEEE | Institute of Electrical and Electronics Engineers |
| IRI | Industrial Risk Insurers |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturer's Association |
| NESC | National Electrical Safety Code |

| | |
|----------|---|
| NFPA | National Fire Protection Association |
| OK/DEQ | Oklahoma State Department of Environmental Quality |
| SBI | Steel Boiler Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| UFPO | Underground Facilities Protective Organization |
| UL | Underwriter's Laboratories, Inc. |
| OSHA | Occupational Safety and Health Administration |
| XL - GAP | XL Global Asset Protection Services |

1.7 DEFINITIONS

| | |
|---|---|
| Acceptance | Owner acceptance of the project from Contractor upon certification by Owner's Representative. |
| As Specified | Materials, equipment including the execution specified/shown in the contract documents. |
| Basis of Design | Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.) |
| Code Requirements | Minimum requirements. |
| Concealed | Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade. |
| Coordination Drawings | Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended. |
| Delegated-Design Services | (Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations. |
| Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required | Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer. |
| Exposed | Work not identified as concealed. |

| | |
|--------------------------------|---|
| Extract | Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications. |
| Furnish | Purchase and deliver to job site, location as directed by the Owner's Representative. |
| Inspection | Visual observations by Owner's site Representative. |
| Install | Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional. |
| Labeled | Refers to classification by a standards agency. |
| Manufacturers | Refer to the article, Equipment Arrangements, and the article, Substitutions. |
| Prime Professional | Architect or Engineer having a contract directly with the Owner for professional services. |
| Product Data | Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work. |
| Provide (Furnish and Install) | Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated. |
| Relocate | Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use. |
| Remove | Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner. |
| Review and Reviewed | Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. |
| Roughing | Pipe, duct, conduit, equipment layout and installation. |
| Samples | Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged. |
| Satisfactory | As specified in contract documents. |
| Shop Drawings | Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work. |
| Site Representative | Owner's Inspector or "Clerk of Works" at the work site. |
| Submittals Defined (Technical) | Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents. |

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.
- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.
- C. Refer to Section 013300 - Submittal Procedures for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 UTILITY COMPANY SERVICES

- A. Plumbing Contractor shall make arrangements with utility for gas service to the Owner's distribution system. Provide service to the building as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the gas service shall comply with the published Utility Company standards. **PAY ALL UTILITY COMPANY CHARGES; INCLUDE CHARGES IN THE BASE BID.**

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 COORDINATION SHOP DRAWINGS

- A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
1. Siphonic roof drainage is an engineered system, and priority must be given to the location and elevation of all siphonic roof drainage piping.
 2. The HVAC Contractor shall prepare the base plan coordination drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be redrawn.
 3. The HVAC Contractor shall provide reproducibles and/or prints and submit the base plan to all Contractors. Electronic drawing files may be furnished to the contractors which have the CAD capabilities required for their use.
 4. The Plumbing/Fire Protection Contractor shall draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
 5. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
 6. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.

7. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
 8. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.
- B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
 2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment

or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.17 PAINING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Refer to Division 9 - Finishes, for additional information.

1.18 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.19 CHASES

- A. New Construction:
 - 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
 - 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.

3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.20 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.21 NON-RATED WALL PENETRATIONS

- ##### A.
- Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.22 PENETRATION FIRE STOPPING

- A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 ACCESS PANELS

- A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.25 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.26 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Install controls and devices furnished by others.
- C. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- D. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.27 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.28 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016000 - Product Requirements for additional information.

1.29 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.30 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing and Electrical Trades add contract items to the chart provided by the Heating Trade or provide separate charts.

1.31 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.32 OPERATION AND MAINTENANCE MANUALS

- A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.
- B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.33 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.34 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.35 TEMPORARY HEAT

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary

1.36 TEMPORARY FACILITIES

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.37 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.38 SYSTEM START-UP AND TESTING

- A. All new heating and ventilating systems shall be started up and operated at normal operating temperature for a period of 24 hours to "bake-off" the equipment. The associated ventilation system shall run on 100% outside air during the bake-off for an additional eight hours to purge the building. This work shall be completed prior to occupancy or on a Saturday, with the Contractor responsible for being on site during the entire purge and bake-off operation.

1.39 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a \$50.00 charge per drawing file and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
 2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.40 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 270500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation and related Work as required in Contract Documents. This section specifies general wiring requirements for systems provided under 27 Series sections of these specifications.

1.3 SUBMITTALS

- A. Refer to particular Specification Sections covering all systems. Submit system test reports as called for.

1.4 GENERAL REQUIREMENTS

- A. Provide conduit systems and special systems as called for.
 - 1. Provide conduit, wireway, wire terminations, etc., necessary to provide for system functions.
 - 2. Cross-sectional area of wires installed in a conduit shall not exceed 40% of the cross-sectional area called for in the National Electrical Code.
 - 3. Provide separate circuit power source for each system.
 - 4. Where allowable by Code and contract documents, special systems wiring may be installed without conduit. Installation and wire insulation types shall be as described by NEC, Article 725. All low voltage wiring circuits 50V and under shall:
 - a. Be adequately supported using bridle rings or other approved method when installed horizontally above accessible ceilings or run exposed in unfinished areas.
 - b. Be installed in conduit when installed vertically in Mechanical Rooms from panels and devices up to ceiling.
 - c. Be installed in conduit in all cases not specifically covered by the above cases, or where subject to physical damage.
 - d. Have the proper insulation and meet the requirements of NEC Article 300-22 when installed in plenums or other spaces used for environmental air.

- B. Identification:
 - 1. Provide consistent color code wiring and identify with permanently attached number to each end of each wire, except where color coding is prohibited to meet UL burglary protection requirements.
- C. Termination:
 - 1. Unless special terminations are required, such as coaxial cable termination, wires shall be terminated on screw type terminal blocks with metal terminal cabinets.
- D. Wiring Diagrams:
 - 1. Install systems in accordance with manufacturer's certified correct wiring diagrams.
 - 2. Provide record drawings for each system, with wire identification, numbers and colors, as installed.

PART 2 - PRODUCTS

2.1 MAKE AND SERVICE

- A. Provide devices and equipment by an established manufacturer for respective systems. All devices and equipment for which there is a listing shall be UL listed and FM approved.
- B. Provide system equipment and devices of one manufacturer who maintains a competent service organization and who shall be prepared to offer a service contract for maintenance of the respective system.
- C. Provide three service organization inspections for each system at four-month intervals during the year following final acceptance.
- D. Correct defects found in the system at the time of these inspections.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide complete installation in a neat and workmanlike manner including all accessories and appurtenances for a complete operating system, including equipment mounting backboards, power supplies, wiring, etc.
- B. Each system installation shall be supervised, tested, adjusted and approved by authorized representative of the manufacturer of the system devices and equipment.

- C. Provide written statement from the authorized representative of the manufacturer of the system devices and equipment that the completed system has been inspected and tested and is approved.
- D. Riser and wiring diagrams are not intended as final installation drawings but only as a guide for bidding. Install system based on final wiring drawings prepared by the manufacturer of the system.

3.2 WIRING

- A. Wire sizes shall be as recommended by system manufacturer.
- B. #14 AWG wire, minimum unless otherwise called for.
- C. #12 AWG wire, minimum for alarm signal circuits and all power supplies.
- D. Provide #20/2 copper minimum twisted and shielded with overall jacket for audio frequency circuits. Shield shall be Mylar backed aluminum foil with drain wire, or copper braid. Do not provide spiral wrap shielding.
- E. Provide coaxial cable and fiberoptic cable as called for video and RF distribution.
- F. Do not install low level lines such as microphone wires in same conduit with high level lines such as speaker wires.
- G. All final wire connections and terminations shall be performed by an authorized representative of the equipment manufacturer who is regularly engaged in, and experienced in this type of work. Subcontracting this work to others is not acceptable.

END OF SECTION 270510

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment, services, etc. for a complete functional Local Area Network (LAN) and related work as required in the Contract Documents.

- B. The systems to be provided shall be for a switched LAN environment. The system shall hereafter be referred to as the Data Network System.

- C. Basic Intent:

- 1. Located throughout the building as shown on the drawings, are places where computers and associated equipment are intended to be placed and connected to the network for the purposes of utilizing common resources.
- 2. The telecommunications rooms for the data network in the building(s) are located as shown on the drawings.
- 3. Located in various other places are additional Telecommunication Rooms. It is intended that these be connected with the Main Telecommunication Room by a fiber optic cable backbone. From each of these locations, data cable is to be run to the data jacks where computer equipment is connected.
- 4. Patch panels shall be used as termination points for all fiber optic cabling. Provide backbone cabling between telecommunication rooms as indicated.
- 5. Patch panels shall be used as termination points for all data cables and the individual fiber cables in telecommunication rooms.

- D. Scope of Work:

- 1. Extend Telco services from the demarcation location in Server Room to the Network Services Core Switches and distribution equipment located in the Server Room.
- 2. Extend fiber optic backbone cable consisting of 24 strands single-mode and 24-strands 50 micron multi-mode type OM-3 cable from the MDF to IDF #_____.
- 3. Extend fiber optic backbone cable consisting of 24 strands single-mode and 24-strands 50 micron multi-mode type OM-3 cable from the MDF to the data rack in the Surveillance Equipment Room and to Surveillance Equipment data rack located in the MDF.
- 4. Extend fiber optic redundant backbone cable consisting of 12 strands single-mode and 12 strands 50 micron multi-mode type OM-3 from each IDF to the MDF and from the data rack in the Surveillance Equipment to the MDF and from the Surveillance equipment data rack in the Server Room to the MDF.

5. The fiber optic backbone cable shall be run via the underfloor 2 in. raceways provided. The redundant fiber optic backbone shall be routed via the area under the raised floor as a separate pathway.
6. Provide room build-out of all IDF rooms consisting of plywood backboards, full height on all walls painted with two (2) coats of fire resistant paint, data racks, quantity as indicated, IDF ground termination bars, raceways, sleeves, complete pathways, supports and firestopping. Provide data equipment racks or enclosed lockable cabinets in the quantities indicated on the contract documents. Provide fiber optic enclosures, fiber optic patch panels, copper patch panels, horizontal and vertical cable management system for the complete data rack/cabinet build-out.
7. Provide horizontal wiring consisting of Category 6 data cable for all work area outlets, Point of Sale devices, Automatic Jackpot Machines, ATM's, data outlets for table game use and all other data outlets unless otherwise noted. Provide Category 6A data cable for all TV locations, and digital signage locations.
8. Contract documents indicate general locations of surveillance cameras. Extend Category 6 data cable from the Surveillance Equipment room data rack or the Surveillance System data rack located in the Server Room. For cameras located within the building leave 15 ft. of data cable coiled at the camera location to allow for final positioning of the camera.
9. Extend six (6) strands of 50 micron multi-mode fiber optic cable from the Surveillance Equipment Room via underground raceway to pole-mounted parking lot camera locations. Provide media conversion device and extend Category 6 data cable to parking lot cameras.
10. Slot Machine data wiring shall consist of four (4) Category 6A data cables routed from the local IDF indicated to each bank of slot machines unless otherwise noted. Leave the data cables under the raised floor in the area of the slot bank and leave 15 ft. of cable coiled at this location to allow slot bank relocation. All data cables shall be terminated on Category 6A RJ-45 data connectors. All cables shall be terminated and tested.
11. At the individual table game location provide a communication outlet consisting of a 2-gang outlet box with four (4) Category 6A RJ-45 data connectors.
12. Wireless Access Points (WAP) shall consist of single-gang outlet box with two (2) Category 6A data outlets and 20 ft. coiled cable whip in ceiling space to allow for final WAP location as directed in field. The data cables shall be routed to local IDF as indicated on drawings.
13. Communication Outlets for workstations shall consist of two (2) gang outlet for with a total of two (2) data outlets with the data cables routed from the IDF indicated. Provide data outlets complete with faceplates. Data cable, outlets and faceplate inserts shall be color-coded per the above.
14. Provide OTDR and power meter testing of all strands of fiber optic backbone cable, both primary backbone cable and redundant backbone cable.
15. All data cable, Category 6 and Category 6A for all data network wiring system use shall be tested and shall conform to TIA-568-C.2 Standard.

1.3 TELECOMMUNICATION ROOMS (IDF's)

- A. Each telecommunication room shall be furnished with 3/4 in. plywood backboard, floor to ceiling on all walls, with the plywood backboard painted with two (2) coats of fire resistant paint (UL/ASTM Class A), all surfaces.

1. ANSI/TIA/EIA Telecommunications Building Wiring Standards.
2. IEEE Telecommunications Standards.
3. BICSI Methods Manuals.
4. NFPA 70: NEC

1.4 QUALITY ASSURANCE

- A. Work shall be as specified herein and it shall be neat and orderly installation. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative.
- B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- C. Installation shall be accordance with NFPA 70 (National Electrical Code), TIA/EIA, IEEE, IEC, state codes, local codes, and requirements of the Authority Having Jurisdiction.
- D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMAIEC, TIA/EIA and IEEE Standards.
- E. Each item shall be NRTL tested and listed.
- F. The system provider must:
 1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
 2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.
 3. Maintain adequate spare parts inventory to provide both normal and emergency service.
 4. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
 5. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.
- G. Contractor Qualifications:
 1. This Contractor shall be a certified installer for the proposed equipment/system manufacturer(s) and be BICSI certified ITS Installer 2, Copper and Optical Fiber and shall be certified to terminate indicated fiber connectors.
 2. The cable installer shall provide documentation and references from three (3) similar installations installed within the previous two (2) years within a 60 mile radius.

H. Installer Qualifications:

1. Cabling installer must have personnel certified by BICSI on staff.

1.5 SUBMITTALS

A. Provide the following in a single clear and organized submittal. Package shall be submitted as specified in:

1. Manufacturers catalog sheets, specifications and installation instructions for all system components.
2. Detailed description of system operation.
3. Itemized list of all features and functions.
4. Dimensioned drawings of all system control cabinets and layouts for all equipment rooms.
5. Wiring diagrams showing typical connections for equipment.
6. Contractor certification and qualifications.
7. Riser diagrams showing all components, devices and interconnecting cable types.
8. List of three (3) installations of equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of one (1) year.
9. Warranty information.
10. System test reports.
11. Provide scaled elevation and plan drawings indicating walls, data racks, patch panels, wire management, cable trays, power strips, door swing, etc. for each cable closet/room.

1.6 SYSTEM DESCRIPTION

A. Provide a complete and fully operational state of the art Local Area Network (LAN) system as described herein and indicated on the contract documents. Include any and all interface equipment to supply a complete network with complete equipment connections necessary to form a complete "turnkey" network system as outlined in these specifications.

B. The complete system shall include, but is not limited to, the following:

1. Equipment Room build-out.
2. Telecommunications Room build-out.
3. Equipment cabinets and racks.
4. Patch panels and patch cables.
5. Wire management.
6. Fiber optic backbone cabling.
7. Horizontal cabling.
8. Modular jacks, backboxes and faceplates.
9. Terminations and testing.
10. Raceways, pathways, cable tray, sleeves, pull boxes.
11. Firestopping.

- C. Owner shall provide the network electronics.
- D. The following shall be furnished by the Owner, installed, terminated and tested by this Contractor:
 - 1. Data Network System electronics including wireless access points and controllers.

1.7 WARRANTY

- A. All cable plant parts shall be warranted to the owner for a period of fifteen (15) years as a complete end-to-end system.
- B. All network equipment shall be warranted to the owner for a period of one (1) year. Provide technical support at no charge to the customer for a period of one (1) year after system has been commissioned.
- C. Make available an extended warranty to the customer.
- D. Warranties shall commence upon final acceptance of the system.

PART 2 - PRODUCTS

2.1 BACKBONE WIRING - FIBER OPTIC CABLE

- A. All of the fiber optic cable must meet or exceed the following requirements and specifications.
- B. Individual fiber optic cables shall consist of:
 - 1. The fiber.
 - 2. Tight buffer.
 - 3. Thermoplastic jacket.
 - 4. Central strength member.
 - 5. Aramid strength member.
 - 6. Second core wrap with ripcord.
 - 7. Polyester barrier.
 - 8. Outer jacket.
- C. All backbone fiber optic cable shall be:
 - 1. Installed in plenum rated innerduct labeled on 10 ft. centers - Fiber Optic Cable.
 - 2. Steel armored fiber optic cable shall be armored labeled on 10 ft. centers - Fiber Optic Cable.
- D. Multimode Fiber (Indoor/Outdoor):
 - 1. Maximum attenuation /3300 ft. for each strand of fiber in the cable at temperatures ranging from -40°C to 70°.

- a. 850 nM: 3.5 dB.
 - b. 1300 nM: 1.5 dB.
 2. Minimum Bandwidth/3300 ft.
 - a. 3500 MHz (OM-3).
 - b. 1300 nM: 500 MHz.
 3. Shall be tight buffer, plenum rated, indoor-outdoor breakout style.
 4. Core Type: Graded Index Glass.
 5. Core Diameter: 50 Microns.
 6. Clad Diameter: 125 (+0/-3) Microns Numerical aperture: 0.275.
 7. Minimum Bend Radius:
 - a. Installation - 15 x O.D.
 - b. Long Term - 10 x O.D.
 8. Maximum Loading:
 - a. Short term - 660 lb
 - b. Long term - 330 lb
 9. Strength members shall be FGE/Aramid yarn.
 10. Cable shall meet requirements for plenum and vertical tray cable specifications of the NEC.
 11. All fibers shall be terminated with connectors compatible with cable and patch panel specified.
 12. Shall have individual fiber tube colors per TIA/EIA-598 and overall orange jacket.
 13. Shall be 100 Kpsi proof-tested.
 14. Meet or exceed requirements for TIA/EIA 568-C.3.
- E. Single Mode Fiber (Indoor/Outdoor):
1. Maximum Attenuation per KM:
 - a. 1310 nM- 0.5
 - b. 1550 nM - 0.5
 2. 1310/1550 nM.
 3. Shall be tight buffer, plenum rated, indoor-outdoor breakout style.
 4. Core Type: Single Mode.
 5. Core Diameter: 8.3 Microns.
 6. Clad Diameter: 125 Microns.
 7. Minimum bend radius shall be 20 times the diameter.
 8. Strength members shall be FGE/Aramid yarn.
 9. Shall meet requirements for plenum and vertical tray cable specifications of the NEC.
 10. Provide number of fibers/cable as indicated in riser diagram on Drawings.
 11. Shall have individual fiber tube colors per TIA/EIA-598 and an overall yellow jacket.

F. Acceptable Manufacturers:

1. Panduit

2.2 HORIZONTAL CABLE

A. Category 6 UTP Cable:

1. Cable must be UL listed:
 - a. Plenum shall be listed for limited power CMP-LP (0.7A)
 - b. Riser shall be listed for limited power CMR-LP (0.5A)
2. The cable manufacturer shall be ISO 9001/TL 9000 registered.
 - a. UL listed CMP-LP (0.7A) supporting up to 100 watts.
 - b. UL listed CMR-LP (0.5A) supporting up to 100 watts.
3. Initially, the manufacturer shall perform qualification tests on each cable. These tests shall be performed in accordance with the latest revision of the ANSI/TIA/EIA 568-C.2 Permanent Link Transmission Performance standard prior to shipment.
4. Date of Manufacture: Cable shall be a maximum of one (1) year old, from date of manufacture when installed.
5. Cable shall have a ripcord.
6. Cable shall be plenum rated, 4 pair, 100 OHM, 23 AWG.
7. Cable shall meet all requirements of FCC 68, the latest revision of the TIA/EIA 568B-C.2 and Addenda.
8. Cable shall have blue colored thermoplastic jacket with overall diameter not to exceed 0.365 in.
9. The cable pulling tension shall be rated for 25 pounds minimum.
10. Cable shall be able to withstand a minimum bend radius of 1.0 in. at -20°C without insulation cracking.
11. Cable shall be color coded in accordance with the latest revision of the TIA/EIA T568B polarization sequence.
12. Cable shall not exceed maximum length of 90 meters.
13. Provide a printed report documenting testing based on ANSI/TIA 568 C.2 testing at 250 MHz. The following are the minimum values associated with the cable for a 100 meter length.
 - a. Less than 21.000 ohm per 100 m DC loop resistance.
 - b. Return loss > 20.0 dB.
 - c. Insertion Loss < 31.1 dB/100M.
 - d. Near end cross talk (NEXT)> 35.3 dB (43.4 dB).
 - e. Power Sum - near end cross talk (PS-NEXT)> 41.0 dB.
 - f. Attention to cross talk ratio (ACRF) > 16.2 dB (24.8 dB).
 - g. Power Sum - Attenuation to cross talk ratio (PSACRF) > 13.2 dB (21.8 dB).
 - h. DC resistance unbalance between any two (2) conductors of any pair shall not exceed 3%.

- i. The capacitance unbalance of any pair to ground shall not exceed 33.0pF.
- j. Delay < 490 ns.
- k. Delay skew < 44 ns.
- l. Cable shall be ANSI/TIA/EIA-568.B.2 Category 6 compliant. The cable shall be tested and characterized by the manufacturer.

14. Acceptable Manufacturers:

- a. Panduit

B. Augmented Category 6A UTP Cable:

1. Cable must be UL listed:

- a. Plenum shall be listed for limited power CMP-LP (0.7A)
- b. Riser shall be listed for limited power CMR-LP (0.5A)

2. The cable manufacturer shall be ISO 9001/TL 9000 registered.

- a. UL listed CMP-LP (0.7A) supporting up to 140 watts.
- b. UL listed CMR-LP (0.5A) supporting up to 100 watts.

3. Initially, the manufacturer shall perform qualification tests on each cable. These tests shall be performed in accordance with the latest revision of ANSI/TIA/EIA 568-C.2 standard prior to shipment.

4. Date of Manufacture: Cable shall be a maximum of one (1) year old, from date of manufacture when installed.

5. Cable shall have a ripcord.

6. Cable shall be plenum rated, 4 pair, 100 OHM, 23 AWG.

7. Cable shall meet all requirements of FCC 68, the latest revision of the TIA/EIA 568B-C.2 and Addenda.

8. Cable shall have blue colored thermoplastic jacket with overall diameter not to exceed .215 in. x .290 in.

9. Pulling tension shall be rated for 25 pounds minimum.

10. Cable shall be able to withstand a minimum bend radius of 1.2 in. at -20°C without insulation cracking.

11. Cable shall be color coded in accordance with the latest revision of the TIA/EIA T568B polarization sequence.

12. Cable shall not exceed maximum length of 90 meters.

13. Provide a printed report documenting testing based on ANSI/TIA 568-C.2 tested at 500 MHz. Testing parameters as follows:

- a. Less than 21.0 ohm per 100 m DC resistance.
- b. Return loss > 10.0 dB/100m at 500 MHz.
- c. Insertion loss < 43.8 dB/100m at 500 MHz.
- d. Near end cross talk (NEXT) > 26.7 dB at 500 MHz.
- e. Power Sum - near end cross talk (PS-NEXT) > 23.8 dB at 500 MHz.
- f. Attenuation to cross talk ratio far end (ACRF) > 10.2 dB at 500 MHz.
- g. Power sum - attenuation to cross talk ratio (PS-ACRF) > 7.2 dB at 500 MZz.

- h. DC resistance unbalance between any two (2) conductors of any pair shall not exceed 3%.
 - i. The capacitance unbalance of any pair to ground shall not exceed 65.6 pF per 100 meters.
 - j. Delay < 490 ns at 100MHz.
 - k. Delay skew < 44 ns at 100MHz.
 - l. Cable shall be ANSI/TIA/EIA-568-C.2 augmented Category 6 (Cat 6A) compliant. The cable shall be tested and characterized by the manufacture to 500 MHz.
14. Acceptable Manufacturers:
- a. Panduit
15. All horizontal fiber shall be installed in plenum rated inner duct on J hooks or cable tray.
- a. Raceway shall be labeled on 10 ft. centers as "Fiber Optic Cable".
16. All fibers shall be terminated with compatible connectors in patch panel as specified.
17. Acceptable Manufacturers:
- a. Panduit

2.3 PATCH CABLES

A. Patch Cables - UTP:

- 1. Provide patch cable for use in the patch panels and field outlets, a minimum of two for each circuit/channel. Quantity of patch cords shall be sufficient to terminate all outlets indicated on drawings as well as 25% spare outlets of each type. Patch cable type shall correlate to the cable color and type and match or exceed the performance characteristics.
- 2. Field verify exact length of patch cords for field outlets and patch panel outlets with the Owner. Assume a typical of two (2) meters each.
- 3. Patch cord shall be stranded with overall jacket and factory made connectors with protective boots.
- 4. All patch cords shall be third party verified.
- 5. Acceptable Manufacturers:
 - a. Panduit

B. Patch Cables - Fiber Optic Cable

- 1. Provide patch cable for use in the patch panels and field outlets, a minimum of two for each circuit/channel. Quantity of patch cords shall be sufficient to terminate all outlets indicated on drawings as well as 25% spare outlets of each type. Patch cable type shall correlate to the cable color and type and match or exceed the performance characteristics.

2. Field verify exact length of patch cords for field outlets and patch panel outlets with the Owner. Assume a typical of two (2) meters each.
3. Patch cord shall meet the specifications for the cable to which it is connected to.
4. All patch cords shall be third party verified.
5. Acceptable Manufacturers:
 - a. Panduit

2.4 PATCH PANELS

A. UTP Cable Patch Panels:

1. All panels should consist of a faceplate, mounting, hardware, isolation bushings, connector assemblies and labels for all ports.
2. Provide patch panels in each enclosure or rack to which the cable is to be terminated. Patch panels shall be of the type, performance and Category to match the cabling.
3. Patch panels shall be mounted in standard 19 in. racks/cabinets.
 - a. Contractor shall provide multiple 48-port patch panels having wiring configuration specified with insulation displacement connectors on the back and 8P8C universal modular jacks on the front.
 - b. Contractor shall provide quantity of patch panels to terminate all UTP cable. There shall be a minimum of 25% spare capacity for future installation.
4. Jacks shall be 8P8C, T568 universal and have 110 style termination blocks.
5. Panels shall have factory labels for each port.
6. All cables are to be terminated per EIA/TIA 568B or 568A standards, if applicable, and dressed in a neat workmanship way.
7. Modular jacks shall be mounted on PC boards to offer low insertion and NEXT loss.
8. Provide grounding screw assembly with serrated head screw and manufacturer recommended connection to the associated rack.
9. Shall exceed EIA/TIA-568, UL1863 and FCC Part 68 performance specified.
10. Acceptable Manufacturers:
 - a. Panduit

B. Fiber Optic Patch Panels

1. Provide fiber optic patch panels in where fiber optic cable is to be terminated.
2. Provide LC to LC style panel base. Provide quantity of ports to terminate all strands of the fiber optic cable with additional 25% spare ports.
3. Shall mount in standard 19 in. rack and be constructed of 16 gauge steel and have gasketed openings and hinged door for easy access.
4. Provide wire management below and in rear of patch panel.
5. Patch panels to have modular ports with 12 minimum ports.

6. Acceptable Manufacturers:
 - a. Panduit

2.5 OUTLETS AND CONNECTORS

A. UTP Outlets/Connectors:

1. Physical Specifications:

- a. Shall be 8 position connector compatible with the cable characteristics.
- b. Shall be modular and snap-in to user configurable faceplates for future retrofits meeting durability requirements specified in the latest revision of the CEI/IEC standard.
- c. Shall be IDC type suitable for eight 22-24 AWG wires with a gas-tight connection.
- d. Each contact surface shall have at a minimum, copper alloy with 50 micro-inches gold over nickel and a minimum contact force of 100g.
- e. Conductors shall be separated and aligned internally by jack comb.
- f. Shall have easy to read 568A/B color scheme to prevent termination errors.
- g. Wired in accordance with TIA/EIA polarization sequence specified in Patch Panel section of this specification.
- h. Transmission characteristics shall meet the requirements for the UTP cabling specified.
- i. Minimum durability shall be 1000 connecting cycles.

2. Acceptable Manufacturers:

- a. Panduit

B. Fiber Optic Multimode Outlets/Connectors

1. Physical Characteristics:

- a. Shall be LC type with insertion release mechanism.
- b. Shall terminate up to 125 micron fiber.
- c. Shall meet dimensional criteria of the latest revision of ANSI/EIA/TIA.
- d. Typical outlet box shall be sized to insure minimum bend radius and store 1 meter of two strand fiber cable.

2. Transmission Characteristics:

- a. Maximum loss of 0.3 dB per pair.

3. Acceptable Manufacturers:

- a. Panduit

2.6 COLOR CODING

- A. Cable outer jacket shall follow the color coding scheme as follows. Jacket color shall be continuous. Patch cords shall match the cabling.
- B. Fiber Optic Cable:
 - 1. Backbone Cabling:
 - a. Single Mode - Yellow
 - b. Multimode (OM3) - Aqua

2.7 DISTRIBUTION ENCLOSURES/RACKS

- A. All enclosure/racks shall be properly sized and of the proper quantity to house all of the required components and 25% spare space capacity. Provide grounding stud for each vertical rack.
- B. Label each rack/enclosure designating it per the latest TIA/EIA standard:
 - 1. Adhered plastic electronic printed label with 1/2" high lettering minimum.
 - 2. Mount to top and bottom of each rack/enclosure.
- C. Enclosed, Floor Mounted Cabinet:
 - 1. Steel framed, smoked Plexiglas door with lock (keyed to the Owners standard), full length piano hinge and field adjustable swing.
 - 2. Steel Rear Door with Lock (lower half vented).
 - 3. Two (2) eight position vertical mounted power strips.
 - 4. Fan Assembly - Suitable top mounted fans (two minimum) for an ambient temperature of 85°F.
 - 5. Wire management brackets.
 - 6. Adjustable front and rear mounting rails.
 - 7. Adjustable 19 in. wide mounting rails. Depth to accommodate the intended equipment (32 in. minimum).
 - 8. Color black.
 - 9. Verify swing of door in the field prior to ordering.
 - 10. Unit width shall accommodate racking, power strips and cable management.
 - 11. In locations requiring two or more enclosures, side panels shall be removed and cabinets shall be bolted together allowing access between cabinets.
 - 12. Size: Cabinets shall be 36 in. wide x 43 in. deep.
- D. Open, Floor Mounted Racks:
 - 1. Nominal size shall be 19 in. wide x 7 ft. high x 20 in. (minimum) deep. Rated for 2000 lb. minimum. Depth to match the intended equipment.
 - 2. Rack shall be constructed of 6061-T6 aluminum extrusion, with EIA = 3 in. x 1.265 in. channel, 1/4 in. thick flange.
 - 3. Provide base angles and top cross bars.
 - 4. The back of rack shall have wire management panels and cable tray to wall.

5. Rack shall have baked enamel finish.
- E. Enclosed, Wall Mounted Cabinet:
1. Standard 19 in. wide, 24 in. deep cabinet.
 2. Height as required.
 3. 16 gauge cold rolled steel.
 4. Rack shall have locking front door.
 5. Ventilated side panels.
 6. Two (2) six position power strips.
 7. Rack construction shall match freestanding.
 8. Racks shall have dual piano hinges to allow access to front and rear.
 9. Provide vertical and horizontal wire management.
 10. Verify swing of door in field prior to ordering.
- F. Equipment Shelves:
1. Provide quantity of equipment shelves as indicated.
 2. Shelves shall be made of .09 in. aluminum and shall support up to 30 lbs. on each side. All mounting hardware shall have baked enamel finish.
- G. Acceptable Manufacturers:
1. ADC

2.8 CABLE MANAGEMENT

- A. All racks are to be provided with cable management hardware to insure a neat, functional system when complete. Racks shall as a minimum, include the following:
1. PVC construction; duct fingers to manage cabling; color to match enclosure.
- B. All racks shall have 8 in. wide vertical full height cable management, including cover, front and rear, on both sides of the rack.
- C. All racks shall have 2RU space horizontal full width cable management, front and rear, above and below each patch panel and piece of equipment.
- D. Cabinets shall have 1RU space horizontal panels, front and rear, above and below each patch panel and piece of equipment.
- E. All data distribution frame plywood backboards shall be provided with vertical and horizontal wire management with capacities to house all possible future cabling and patch cords for a neat and orderly installation.
- F. Acceptable manufacturers:
1. Panduit

2.9 INNERDUCT

- A. Innerduct shall be corrugated HDPE material, plenum rated, flexible, continuous, UV rated with flame/smoke spread in accordance with code and length markings on the outer surface.
- B. When in conduit minimum size shall be 3/4 in., otherwise 1 1/2 in. minimum.
- C. Acceptable manufacturers:
 - 1. Carlon
 - 2. Maxcell
 - 3. Opti-Com
 - 4. Approved equal

2.10 LABELING

- A. General:
 - 1. System labeling shall be in accordance with the latest revision of TIA/EIA 606. Labeling system and structure shall match the Owners existing. System shall provide as built final conditions for each cable, port, panel, rack, etc. and utilize MS Excel or approved equal documentation. Provide hard and electronic copy of labeling documentation to the Owner as part of the O and M process.
 - 2. Each label shall contain the Telecommunication Room designated, the room number and the port number in the room. Verify color of label and size of font prior to completion. Provide samples as requested.
 - 3. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers or those indicated on the blueprints.
 - 4. Label each rack and patch panel with 1 in. high lettering, black on white, adhered electronically printed plastic type label with labels at top, bottom, front and back.
- B. Patch Panel
 - 1. Individually label all patch panel ports. Port numbers shall match opposite end outlet/port number.
- C. Outlets
 - 1. Individually label all patch panel ports. Labels shall be installed in a workman-like manner and fit completely in the recessed area of the labeled location.
 - 2. Contractor shall utilize adhered labels at poke-thru locations and any other locations that do not have a label location.

D. Cable

1. Fiber Optic:

- a. Individually label fiber optic cables at each termination point indicating building, destination room, rack number, panel number, port number, strand number and strand color.
- b. Each strand color shall match a specific fiber termination number in each closet, i.e. blue - fiber 1, orange - fiber 2, green - fiber 3, etc.
- c. Cable label shall be adhered electronically printed plastic type with cable designation fully visible.

2. Copper

- a. Specifically label cables at each termination point indicating the destination room, rack number, panel number and port number.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Provide a minimum of one horizontal UTP cable to each communication outlet jack from respective equipment/telecommunications room patch panel as called for. Quantity of data jacks equals minimum quantity of UTP cables (typical).
2. Provide a minimum of one (1) pair (2 strands) of multi-mode fiber optic cable to each fiber jack from respective equipment/telecommunications room as called for. Quantity of fiber jacks equals minimum quantity of 2 strand cables (typical).
3. All risers, and wiring concealed in walls or soffits, shall be installed in metal conduits.
4. All cable above accessible ceilings shall be installed in cable tray or J-hook style cable rings 3 ft. O.C.
5. Provide wire management and Velcro cable wraps every 24 in. throughout closets. Provide Velcro cable wraps every 36 in. elsewhere.
6. Wiring/cablings shall be installed in accordance with the manufacturer's recommendations. If the manufacturer recommends larger wire sizes, they shall be provided. However, smaller sizes or lower cable categories are not acceptable.
7. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements and conduit sizes.
8. Install UTP cable in accordance with latest revision of TIA/EIA 568 standards.
9. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
10. All raceways and closets shall be installed in accordance with latest revision of TIA/EIA-569.

11. All cables shall be labeled in accordance with latest revision of TIA/EIA 606 and these specifications.
 12. All horizontal cables shall be terminated in patch panels at the distribution frames, and at the UTP jack at the telecommunications outlet.
 13. Maximum length shall be 90 meters.
- B. Fiber Optic Cable:
1. Terminate backbone fiber cables in rack mounted patch panels at both ends.
 2. Adhere to all manufacturer bend radius recommendations.
- C. Terminations:
1. All terminations shall be made by a manufacturer's trained representative.
 2. Use termination kits for fiber and UTP that are approved by the manufacturer of the cable.
 3. All backbone cable shall be terminated in a patch panel and all connections between horizontal and backbone cables shall be through cross connect cable.
- D. Equipment and Devices:
1. Install all devices where shown on drawings. Provide all necessary conduit outlet boxes, junction boxes, supports, etc. Verify all required box sizes with the system supplier and coordinate with bending radius needs. All devices shall be modular for future moves and changes.
 2. Install all equipment in specified 19 in. racks/cabinets leaving minimum 30 in. of access space on sides and back of rack and 36 in. in front of rack.
 3. Provide all power outlets and plug strips required for system operation but not shown on plans.
- E. Raceways:
1. Minimum size raceway shall be 1 in.
 2. Minimum backbox size for telecommunications outlet locations shall be two-gang with raised cover; no single-gang boxes allowed.
 3. Provide no greater than 180° in bends without pull box in any raceway.
- F. Data Network Ground System:
1. Provide grounding system for all equipment rooms and telecommunication rooms as called for in Specification Section 260526.
- G. Telecommunications Rooms:
1. Provide 3/4 in. x 4 ft. high continuous plywood backboard with two (2) coats of medium gray fireproof paint in telecommunications rooms.
 2. Coordinate with other trades to avoid services being installed above telecommunications racks.

3.2 TESTING

- A. Copper Cable: System supplier shall channel test end-to-end each permanent link connection using latest 200 MHz for Cat 6, 500 MHz for Cat 6A 1000 Mbps IEEE testing procedure. Tester must conform to the latest standards at the time of testing not time of bid and be Fluke DTX-5000 with latest software version, or approved equal. Testing shall be performed by a technician trained with the specific testing equipment. Testing shall be witnessed by the Owner's Representative.
- B. Fiber Optic Cable: Provide an OTDR test for all fiber optic cable and connections per latest IEEE and ANSI accepted procedures. Test shall utilize Fluke Opti Fiber Pro OTDR.
- C. Replace any cables and connectors that do not meet or exceed standards referenced and stated herein and then tested. Testing shall be end-to-end / port-to-port for each cable.
- D. Test equipment shall be in good condition and working order, calibrated within one year of its use and utilize leads without twisting and kinks. Unit calibration shall be in accordance with Level III Field Tester per ANSI/TIA 1152.
- E. Test Reporting:
 - 1. The field testing shall be accurately documented for submission, inclusion in O&M Manuals and for Owner future use.
 - 2. Test reports shall include data directory table cross-referencing room numbers and cable numbers with the test report. Post copies of directory at telecommunications room location.
 - 3. Report shall utilize electronic Windows based documenting with a hard and electronic copy provided to the Owner.
 - 4. The report documentation for each cable test shall include the following as a minimum:
 - a. Project name.
 - b. Test equipment manufacturer and model number, and last calibration date.
 - c. Date and time of the test.
 - d. Patch panel identification.
 - e. Cable identification.
 - f. Cable type.
 - g. Pass/Fail: Pass indicating meeting or exceeding the identified criteria or standard (whichever more stringent) for all parameters. Fail indicating test not meeting identified criteria for one or more parameters.
 - h. Test pass criteria.
 - i. Cable length.
 - j. Propagation delay and attainable bandwidth.
 - k. List of tested parameters with test and allowable values. Any failed parameters shall be noted or highlighted.

3.3 TRAINING AND INSTRUCTION

- A. Provide four (4) hours minimum of instruction to Owner personnel regarding system set up configuration and management. Training shall be sufficient for the Owner to understand the system operation, components, configuration, functions, testing and troubleshooting. All Owner questions shall be answered.
- B. Training agenda (estimated duration, intent, specifications to be covered) shall be submitted for approval prior to the training. A finalized agenda shall be issued to the Owner and construction representative one (1) week minimum prior to the scheduled training. Owner's comments shall be incorporated and agenda redistributed prior to the training.
- C. Two (2) hard copies and one (1) electronic (pdf) copy of the training materials shall be provided.

3.4 WARRANTY

- A. All cable plant parts shall be warranted to the owner for a period of fifteen (15) years as a complete end-to-end system.
- B. All network equipment shall be warranted to the owner for a period of one (1) year. Provide technical support at no charge to the customer for a period of one (1) year after system has been commissioned.
- C. Make available an extended warranty to the customer.
- D. Warranties shall commence upon final acceptance of the system.

END OF SECTION 272100

SECTION 274116 AUDIO/VISUAL AND CONTROL SYSTEMS - FACILITY SPACES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation of the audio/visual and control systems as described in this Section and detailed on the drawings.
- B. Audio/visual and control systems shall be provided in the areas as shown on drawings.
- C. Control system shall provide (minimally) for touch control of sound levels by zone, audio source selections, lighting, window shades and head end equipment.

1.3 GENERAL REQUIREMENTS

- A. All equipment shall be U.L. listed, where a listing is available.
- B. All equipment shall comply with pertinent Standards.
- C. All materials furnished and all work performed shall comply with all State, County and Local Authority Codes.

1.4 QUALITY ASSURANCE

- A. Equipment furnished under this specification shall be the standard offering of a single system integrator having a minimum of ten (10) years' experience in this field.
- B. The system integrator shall be a direct manufacture's authorized agent of the product(s) being provided, with employees that are factory-trained and certified in the installation, maintenance and programming of the system components. The system integrator shall produce copies of their employee's current manufactures' and other individual certifications, for all products being supplied in the project. Copies of the system integrators' manufactures dealership agreements and employees' factory training certifications shall be included with each submittal package. A part time or temporary employee, or the subcontracting of individuals for the use of their dealership agreements, certifications or skillsets, is not acceptable.
- C. The system integrator shall maintain a service department located within a seventy-five (75) mile radius and have available a minimum of two (2) factory trained technicians within a twenty-four (24) hour period.

- D. All components shall be fully tested and documented to operate as a complete system. Equipment racks shall ship to the site with the equipment racked, wired, pre-configured, updated, tested, de-bugged and ready for integration. Equipment racks shall arrive on site wrapped for dust protection, and secured on a skid. Staging, uncrating and assembling of components into equipment racks shall not occur on the job site, and is not acceptable.
- E. The system integrator shall provide all hardware, software, terminations, cabling and testing required to make a fully operational system. The system integrator shall guarantee that all replacement parts, or manufactured approved replacement, will be carried in stock for a period of five (5) years minimum from the date that the system is commissioned. All replacement parts must be available within five (5) working days.
- F. After training is completed, contractor shall provide the owner with three (3) copies on USB drives, of all applicable system information, programming and intellectual property to include: system passwords, compiled, zipped and able to be edited source code, any / all touch panel layouts, button controller layouts, apps, web pages, customized macros, created libraries, and learned IR files.
- G. System supplier must provide documentation and references from two (2) similar installations installed within the previous two (2) years within a one-hundred (100) mile radius.

1.5 SUBMITTALS

- A. Manufacturers catalog sheets, specifications and installation instructions for all components.
- B. Detailed description of system operation.
- C. Itemized list of all features and functions.
- D. Preliminary touch panel designs.
- E. Wiring diagrams showing typical connections for equipment.
- F. Riser diagrams showing all components, devices and interconnecting cable types.
- G. List of two (2) equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of six (6) months.
- H. Warranty information.
- I. Information detailing future additions and pending upgrades to the system.
- J. Cut sheets on all cables.

1.6 SYSTEM DESCRIPTION

- A. Provide a state of the art audio/visual and control system.

- B. Provide system configuration, programming and commissioning.
- C. Facility wide control system shall provide (minimally) for touch control of facility sound levels by zone, audio source selections, lighting, motorized lifts and head end equipment.
- D. All Touch panel access shall be password protected.
- E. Facility Touch Panels shall be programmed to track each other's status.
- F. Touch panels shall also be compiled as web pages, and control functions shall be accessible via web browser(s).

PART 2 - PRODUCTS

2.1 TOUCH SCREEN DISPLAYS

- A. Provide touch screens in the facility, where shown on drawings.
 - 1. Display Size: 7.3"w x 4.8"h 8.8" diagonal.
 - 2. Resolution 1024x600, Aspect Ratio 16:9
 - 3. Viewing Angle Vertical: $\pm 89^\circ$, Horizontal: $\pm 89^\circ$
 - 4. Touch Overlay Projected capacitive, multi-touch support, 3 simultaneous max
 - 5. Graphics Engine AMX G4
 - 6. Front Panel Components Light Sensor, Proximity Detector, Sleep button.
 - 7. Power Consumption Full-On: 8 W.
 - 8. Temperature Range Operating: 32° F to 104° F (0° C to 40° C)
 - 9. Design Make: AMX MXD-700-NC

2.2 CONTROL SYSTEM

- A. Provide an I.P. network based control system.
 - 1. Dimensions: 1 4/5"h x 17"w x 9 1/8"d, Weight 6.08 lb. (2.758 Kg)
 - a. Memory Card: 8 GB SD, NVRAM: 1 MB, DDRAM: 512 MB, Note: Supports external USB Solid State Drives
 - b. Power Consumption Active Power Consumption: 6.6 W
 - c. AxLink Port (2) 4-position 3.5mm Screw Terminal, provides data and power to external AxLink control devices
 - d. AxLink Indicator (2) AxLink LED (green) indicates the state of the AxLink port.
 - e. IR/Serial (8) 2-position 3.5mm Screw Terminal, 8 IR Transmit / 1-way Serial ports, NetLinx Ports 11-18, Support high-frequency carriers up to 1.142 MHz, 8 IR/Serial data signals can be generated simultaneously
 - f. I/O Channels (8) One 10-position 3.5mm Screw Terminal, 8-channel binary I/O port for contact closure with each input being capable of voltage sensing, NetLinx Port 22, Channels 1-8

- g. I/O Indicator (8) LEDs (yellow) indicate each of the I/O channels (1-8) are active
- h. Relays (8) Two 8-position 3.5 mm Screw Terminal, (8) single-pole, single-throw relays, NetLinx Port 21, Channels 1-8, Each relay can switch up to 24 VDC or 28 VAC @ 1 A, Each relay is independently controlled
- i. Design Make: AMX Netlinx NX-3200 integrated controller with PSN6.5, 6.5 A Power Supply (FG423-41), include all required IR emitters, control and interconnecting cables.

2.3 WIRELESS MICROPHONE

- A. Provide a wireless microphone system.
 - 1. Wireless microphone system shall include a true diversity receiver.
 - 2. Receiver shall have 60 channels pre-set per frequency band, 17 compatible channels per 6 MHz TV channel.
 - 3. Receiver shall provide transparent, 24-bit digital audio.
 - 4. Frequency Range 20 Hz – 20 kHz.
 - 5. Receiver shall be 1/2 rack design, with detachable 1/4 wave antenna
 - 6. Receiver shall have a network port for monitoring, and a DC power connector.
 - 7. Receiver shall have XLR and 1/4” outputs that are Mic/line level selectable.
 - 8. Wireless microphone system shall include a transmitters.
 - 9. Transmitter shall have a 3–segment battery fuel gauge with backlit LCD.
 - 10. LCD Display shall show frequency and power settings.
 - 11. Transmitter shall have a control lockout feature.
 - 12. Transmitter shall have an 9 ~10 hour battery operating life.
 - 13. System shall have a 328' (line of sight) operating range.
 - 14. Design Make: Shure QLXD4 receiver, Shure QLX-D2/Beta58a - QLXD-1 Bodypack Transmitter with MX-150 Lavalier Mic and rack mount kit.

2.4 CABLE HDTV RECEIVERS

- A. Provide clamping rack shelves to rack mount the Owner provided cable TV receivers.
- B. Provide audio cabling from cable TV receivers to Audio Router inputs.
- C. Program for control system control of cable HDTV receivers and audio content/zone routing.

2.5 CD / BLUETOOTH MEDIA PLAYER

- A. Deck shall be an integrated CD / Bluetooth player with 3.5 mm auxiliary input jack.
- B. Playable formats shall include: CD-DA, MP3, WAV.
- C. CD-DA Playback specifications:

1. Audio Modes: Stereo / Dual Channel.
 2. Sampling Frequency: 44.1kHz
 3. Sampling Bit Rate: 16 bit
- D. CD-MP3 Playback specifications:
1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
 2. Sampling Frequency: 32/44.1/48kHz
 3. Sampling Bit Rate: 32 bit / 320 Variable bit rate
- E. CD-WAV Playback specifications:
1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
 2. Sampling Frequency: 8/16/32/11.025/22.05/44.1/12/24//44.1/48kHz
 3. Sampling Bit Rate: 16 bit.
- F. Auxiliary 3.5mm input jack specifications:
1. Connector: 3.5mm stereo mini jack.
 2. Input Impedance: 22k ohms
 3. Nominal Input Level: -20dBV (Maximum -4 dBV).
 4. Auxiliary RCA output jacks specifications:
 - a. Connector: RCA pin-jack.
 - b. Input Impedance: 200 ohms
 - c. Nominal Output Level: -10dBV (Maximum +6 dBV).
- G. Bluetooth specifications:
1. Version 3.0.
 2. Output Class: 2
 3. Supported profile: A2DP, AVRCP
 4. Supported A2DP codec: SBC, AAC, apt X.
 5. Supported content protection: SCMS-T
- H. Audio Performance specifications:
1. Frequency response 20Hz-20kHz, +/-1dB (playback, JEITA).
 2. Distortion: 0.01% or less (playback, JEITA).
 3. S/N ratio: 90dB or greater, dynamic range: 90dB or greater.
 4. Channel separation: 90dB or greater.
- I. Power: AC120V, 60Hz, 11watts.
- J. Dimensions: 481(W) × 94.5(H) × 298(D) mm, weight 4.5 kg.
- K. Design Make: Tascam CD-200BT or approved equal.

2.6 AUDIO ROUTER / DSP

- A. Provide a configurable audio DSP, with a high bandwidth, fault tolerant digital bus, employing Dante Networked Audio protocol.
 - 1. Analog Inputs up to 16
 - 2. Digital Inputs up to 16
 - 3. AEC Inputs up to 16
 - 4. Analog Outputs up to 16
 - 5. Digital Outputs up to 16
 - 6. Telephone Connection up to 4
 - 7. 256 Channel, Low Latency, Fault Tolerant Digital Audio Bus.
 - 8. Control RS-232, GPIO
 - 9. Design Make: BSS Soundweb London BLU-326DA, populated with I/O cards as required.

2.7 AUDIO POWER AMPLIFIERS

- A. Provide Audio Power Amplifiers having the following:
 - 1. DriveCore Technology
 - 2. Configuration and control using HiQnet® Audio Architect™
 - 3. Supports Monitoring and control over TCP/IP
 - 4. Color LCD and front panel user interface for amplifier configuration, control, and monitoring
 - 5. Programmable GPIO (general purpose input/output) control port
 - 6. Digital signal processing (Input/output EQ filters, crossover, input/output delay, Level MAX TM limiters)
 - 7. Support for importing of FIR filter coefficients
 - 8. 20 device presets – 1 factory and 19 user
 - 9. 96kHz/32-bit floating-point signal processing
 - 10. Universal power supply with PFC for reduced current draw
 - 11. Remote power off – Sleep mode activated via AUX port
 - 12. 70Vrms/100Vrms direct drive capable
 - 13. Each channel individually selectable for Low Z or High Z operation
 - 14. Advanced protection circuits – Amplifier and loads are protected against shorted outputs, DC, mismatched loads, overheating, over/under-voltage, and high-frequency overload.
 - 15. Three year, no-fault transferable warranty
 - 16. Design Make: Facility audio amplifiers: Crown CDi 4/300 Drive Core series

2.8 EQUIPMENT RACK

- A. Provide a Floor Standing, lockable equipment rack.
- B. Rack shall be 16-gauge steel construction with 1/8” steel internal braces.
- C. Rack Overall dimensions shall be 22" W x 70.88" H x 27.0" D. Weight capacity shall be 2,500 lbs.

- D. Rackrail shall be constructed of 11-gauge steel with tapped 10-32 mounting holes in universal EIA spacing with black e-coat finish and marked rack spaces.
- E. Rack shall be of fully welded construction. Rack shall be constructed of the following materials: top and bottom shall be 16-gauge steel, horizontal braces shall be 16-gauge steel welded to integral structural side panels of 16-gauge steel giving an 1/8" thick structure, rear door shall be 18-gauge steel, all structural elements shall be finished in a durable black powder coat.
- F. Rack shall have removable split rear knockout panels with 1/2", 3/4", 1", and 1-1/2" electrical knockouts installed in base and a removable rear knockout panel with 1/2", 3/4", 1", and 1-1/2" electrical knockouts and BNC knockouts for antennae installed in top.
- G. Rack shall include solid locking rear door standard and removable key locked side panels with recessed lift handles.
- H. Rack shall be UL Listed in the US and Canada. Rack shall be GREENGUARD Indoor Air Quality Certified for Public buildings. Grounding and bonding stud shall be 1/4-20 threaded, installed in base of enclosure.
- I. Rack shall be warranted to be free from defects in materials or workmanship for the lifetime of the rack.
- J. Design Make: Middle Atlantic WRK series, with locking, plexi-smoked front door, equipment shelves, storage drawer and power strips, or approved equal.

2.9 LOUDSPEAKERS - CEILING STYLE FOREGROUND SPEAKER

- A. The loudspeaker system shall consist of a 6.5 in low frequency transducer, low frequency voice coil shall be 1 in in diameter, .75 in titanium film tweeter, and frequency dividing network installed in a ported enclosure.
- B. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
- C. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
- D. Performance: sensitivity (SPL at 1 m (3.3 ft) with 2.83 V input, swept from 500 Hz to 1.5 kHz) shall be at least 89 dB SPL.
- E. Frequency response: +-3 dB from 75 Hz to 20 kHz.
- F. Rated power capacity shall be at least 75 watts continuous pink noise.
- G. Backcan: Formed steel Baffle/Rim: Medium impact polystyrene, fire rated UL94V-0.
- H. Overall dimensions 8.3in by 9.9 in by 7.5 in deep.
- I. Finish shall be white metal grille.

J. Design Make: JBL Model Control 26c/ct, with 70 v matching transformer.

2.10 LOUDSPEAKERS - INDOOR/OUTDOOR WALL MOUNT BACKGROUND/FOREGROUND SPEAKER

- A. The loudspeaker system shall consist of a 5.25 in low frequency transducer, low frequency voice coil shall be 1 in in diameter, .75 in titanium film tweeter, and frequency dividing network installed in a ported enclosure.
- B. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
- C. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
- D. Performance: sensitivity (SPL at 1 m (3.3 ft) with 2.83 V input, swept from 500 Hz to 1.5 kHz) shall be at least 88 dB SPL.
- E. Frequency response: +-3 dB from 80 Hz to 16 kHz.
- F. Rated power capacity shall be at least 150 watts continuous pink noise.
- G. The entire enclosure shall be manufactured of molded polypropylene structural foam.
- H. Overall dimensions 9.3in by 7.4 in by 5.8 in deep.
- I. Finish shall be white, with metal grille and rubber end protectors.
- J. Design Make: JBL Model Control 25, with 70 v matching transformer.

2.11 PROGRAMMING

- A. Provide all programming required to control all devices and equipment as required by Owner.
- B. Provide all programming modifications requested by the owner for a period of thirty (30) days after substantial completion at no additional cost.

2.12 CABLING

- A. Provide all cabling required for the complete operation of the system. Install all cables in raceways provided by the Division 26 sub-contractor.
- B. Provide Teflon coated plenum rated cable where required by code.
- C. All cable shall be furnished by the control system manufacturer, or shall be verified by the manufacturer as acceptable for use.
- D. Provide signal extenders/converters where required.

2.13 MISCELLANEOUS EQUIPMENT

- A. Provide all required power supplies, interconnect panels and equipment required for the complete operation of the system and interconnection with the audio and visual equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Install all wiring conduits provided by the Division 26 sub-contractor.
2. Provide wiring types and signs as recommended by the manufacturer.
3. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements.
4. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
5. Label all cables at both ends.

B. Equipment and Devices:

1. Install all devices where shown on drawings.
2. Install rack mounted equipment in 19 in. fixed racks leaving a minimum of 30 in. of access space on sides of rack and 36 in. in front of rack.
3. Provide surge suppression per Manufacturer's requirements for all equipment.
4. Provide all power outlets and plug strips required for system operation but not shown on plans.

3.2 PROGRAMMING

- A. One month prior to job completion, the supplier shall arrange a meeting with the Owner at which time the supplier shall configure the system per the Owner's direction. Provide three (3) electronic copies of program.
- B. Provide all Owner requested software modifications for a period of one calendar month after substantial completion at no additional cost to the Owner.

3.3 COORDINATION WITH OTHER TRADES

- A. Coordinate all cable installations with the Division 26 Electrical Subcontractor. Install cables in raceways provided by this Contractor.
- B. Coordinate all power connections to audio/visual control equipment with the Division 26 Electrical Subcontractor. Provide wiring diagrams depicting all connections.

3.4 TRAINING AND INSTRUCTION

- A. Provide 8 hours of instruction to 3 Owner personnel regarding system set up configuration and management.
- B. Provide two (2) hour classes explaining control system use. Two (2) months after initial training sessions repeat with (2) hour session.

3.5 WARRANTY

- A. All standard manufacturers' warranties shall apply.
- B. The installation shall be warranted for one (1) year.
- C. Provide technical support at no charge to the customer for a period of (1) year after system has been commissioned.
- D. Make available an extended warranty to the customer.

END OF SECTION 274116

SECTION 274116.10 AUDIO/VISUAL AND CONTROL SYSTEMS - ENTERTAINMENT BAR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the complete installation of the audio/visual and control systems as described in this Section and detailed on the drawings.
- B. Audio/visual and control systems shall be provided in the areas as shown on drawings.
- C. Control system shall provide (minimally) for touch control of sound levels by zone, audio source selections, lighting, motorized lifts, and head end equipment.

1.3 GENERAL REQUIREMENTS

- A. All equipment shall be U.L. listed, where a listing is available.
- B. All equipment shall comply with pertinent Standards.
- C. All materials furnished and all work performed shall comply with all State, County and Local Authority Codes.

1.4 QUALITY ASSURANCE

- A. Equipment furnished under this specification shall be the standard offering of a single system integrator having a minimum of ten (10) years' experience in this field.
- B. The system integrator shall be a direct manufacture's authorized agent of the product(s) being provided, with employees that are factory-trained and certified in the installation, maintenance and programming of the system components. The system integrator shall produce copies of their employee's current manufactures' and other individual certifications, for all products being supplied in the project. Copies of the system integrators' manufactures dealership agreements and employees' factory training certifications shall be included with each submittal package. A part time or temporary employee, or the subcontracting of individuals for the use of their dealership agreements, certifications or skillsets, is not acceptable.
- C. The system integrator shall maintain a service department located within a seventy-five (75) mile radius and have available a minimum of two (2) factory trained technicians within a twenty-four (24) hour period.

- D. All components shall be fully tested and documented to operate as a complete system. Equipment racks shall ship to the site with the equipment racked, wired, pre-configured, updated, tested, de-bugged and ready for integration. Equipment racks shall arrive on site wrapped for dust protection, and secured on a skid. Staging, uncrating and assembling of components into equipment racks shall not occur on the job site, and is not acceptable.
- E. The system integrator shall provide all hardware, software, terminations, cabling and testing required to make a fully operational system. The system integrator shall guarantee that all replacement parts, or manufactured approved replacement, will be carried in stock for a period of five (5) years minimum from the date that the system is commissioned. All replacement parts must be available within five (5) working days.
- F. After training is completed, contractor shall provide the owner with three (3) copies on USB drives, of all applicable system information, programming and intellectual property to include: system passwords, compiled, zipped and able to be edited source code, any / all touch panel layouts, button controller layouts, apps, web pages, customized macros, created libraries, and learned IR files.
- G. System supplier must provide documentation and references from two (2) similar installations installed within the previous two (2) years within a one-hundred (100) mile radius.

1.5 SUBMITTALS

- A. Manufacturers catalog sheets, specifications and installation instructions for all components.
- B. Detailed description of system operation.
- C. Itemized list of all features and functions.
- D. Preliminary touch panel designs.
- E. Wiring diagrams showing typical connections for equipment.
- F. Riser diagrams showing all components, devices and interconnecting cable types.
- G. List of two (2) equivalent or larger systems that have been installed within the past two (2) years and have been operating satisfactorily for a minimum of six (6) months.
- H. Warranty information.
- I. Information detailing future additions and pending upgrades to the system.
- J. Cut sheets on all cables.

1.6 SYSTEM DESCRIPTION

- A. Provide a state of the art audio/visual and control system.

- B. Provide system configuration, programming and commissioning.
- C. Entertainment Bar control system shall provide (minimally) for touch control of room sound levels, audio source selections, lighting, motorized lifts and head end equipment.
- D. Touch panel access shall be password protected.
- E. Touch panel shall also be compiled as a web page, and control functions shall be accessible via web browser(s).

PART 2 - PRODUCTS

2.1 TOUCH SCREEN DISPLAYS

- A. Provide touch screens in the facility, where shown on drawings.
 - 1. Display Size: 7.3"w x 4.8"h 8.8" diagonal.
 - 2. Resolution 1024x600, Aspect Ratio 16:9
 - 3. Viewing Angle Vertical: $\pm 89^\circ$, Horizontal: $\pm 89^\circ$
 - 4. Touch Overlay Projected capacitive, multi-touch support, 3 simultaneous max
 - 5. Graphics Engine AMX G4
 - 6. Front Panel Components Light Sensor, Proximity Detector, Sleep button.
 - 7. Power Consumption Full-On: 8 W.
 - 8. Temperature Range Operating: 32° F to 104° F (0° C to 40° C)
 - 9. Design Make: AMX MXD-700-NC

2.2 CONTROL SYSTEM

- A. Provide an I.P. network based control system.
 - 1. Dimensions: 1 4/5"h x 17"w x 9 1/8"d, Weight 6.08 lb. (2.758 Kg)
 - a. Memory Card: 8 GB SD, NVRAM: 1 MB, DDRAM: 512 MB, Note: Supports external USB Solid State Drives
 - b. Power Consumption Active Power Consumption: 6.6 W
 - c. AxLink Port (2) 4-position 3.5mm Screw Terminal, provides data and power to external AxLink control devices
 - d. AxLink Indicator (2) AxLink LED (green) indicates the state of the AxLink port.
 - e. IR/Serial (8) 2-position 3.5mm Screw Terminal, 8 IR Transmit / 1-way Serial ports, NetLinx Ports 11-18, Support high-frequency carriers up to 1.142 MHz, 8 IR/Serial data signals can be generated simultaneously
 - f. I/O Channels (8) One 10-position 3.5mm Screw Terminal, 8-channel binary I/O port for contact closure with each input being capable of voltage sensing, NetLinx Port 22, Channels 1-8
 - g. I/O Indicator (8) LEDs (yellow) indicate each of the I/O channels (1-8) are active

- h. Relays (8) Two 8-position 3.5 mm Screw Terminal, (8) single-pole, single-throw relays, NetLinx Port 21, Channels 1-8, Each relay can switch up to 24 VDC or 28 VAC @ 1 A, Each relay is independently controlled
- i. Design Make: AMX Netlinx NX-3200 integrated controller with PSN6.5, 6.5 A Power Supply (FG423-41), include all required IR emitters, control and interconnecting cables.

2.3 WIRELESS MICROPHONE

- A. Provide a wireless microphone system.
 - 1. Wireless microphone system shall include a true diversity receiver.
 - 2. Receiver shall have 60 channels pre-set per frequency band, 17 compatible channels per 6 MHz TV channel.
 - 3. Receiver shall provide transparent, 24-bit digital audio.
 - 4. Frequency Range 20 Hz – 20 kHz.
 - 5. Receiver shall be 1/2 rack design, with detachable 1/4 wave antenna
 - 6. Receiver shall have a network port for monitoring, and a DC power connector.
 - 7. Receiver shall have XLR and 1/4" outputs that are Mic/line level selectable.
 - 8. Wireless microphone system shall include a transmitters.
 - 9. Transmitter shall have a 3–segment battery fuel gauge with backlit LCD.
 - 10. LCD Display shall show frequency and power settings.
 - 11. Transmitter shall have a control lockout feature.
 - 12. Transmitter shall have an 9 ~10 hour battery operating life.
 - 13. System shall have a 328' (line of sight) operating range.
 - 14. Design Make: Shure QLXD4 receiver, Shure QLX-D2/Beta58a - QLXD-1 Bodypack Transmitter with MX-150 Lavalier Mic and rack mount kit.

2.4 CD / BLUETOOTH MEDIA PLAYER

- A. Deck shall be an integrated CD / Bluetooth player with 3.5 mm auxiliary input jack.
- B. Playable formats shall include: CD-DA, MP3, WAV.
- C. CD-DA Playback specifications:
 - 1. Audio Modes: Stereo / Dual Channel.
 - 2. Sampling Frequency: 44.1kHz
 - 3. Sampling Bit Rate: 16 bit
- D. CD-MP3 Playback specifications:
 - 1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
 - 2. Sampling Frequency: 32/44.1/48kHz
 - 3. Sampling Bit Rate: 32 bit / 320 Variable bit rate

- E. CD-WAV Playback specifications:
 - 1. Audio Modes: Stereo / Joined Stereo / Dual Channel / Mono.
 - 2. Sampling Frequency: 8/16/32/11.025/22.05/44.1/12/24//44.1/48kHz
 - 3. Sampling Bit Rate: 16 bit.

- F. Auxiliary 3.5mm input jack specifications:
 - 1. Connector: 3.5mm stereo mini jack.
 - 2. Input Impedance: 22k ohms
 - 3. Nominal Input Level: -20dBV (Maximum -4 dBV).
 - 4. Auxiliary RCA output jacks specifications:
 - a. Connector: RCA pin-jack.
 - b. Input Impedance: 200 ohms
 - c. Nominal Output Level: -10dBV (Maximum +6 dBV).

- G. Bluetooth specifications:
 - 1. Version 3.0.
 - 2. Output Class: 2
 - 3. Supported profile: A2DP, AVRCP
 - 4. Supported A2DP codec: SBC, AAC, apt X.
 - 5. Supported content protection: SCMS-T

- H. Audio Performance specifications:
 - 1. Frequency response 20Hz-20kHz, +/-1dB (playback, JEITA).
 - 2. Distortion: 0.01% or less (playback, JEITA).
 - 3. S/N ratio: 90dB or greater, dynamic range: 90dB or greater.
 - 4. Channel separation: 90dB or greater.

- I. Power: AC120V, 60Hz, 11 watts.

- J. Dimensions: 481(W) × 94.5(H) × 298(D) mm, weight 4.5 kg.

- K. Design Make: Tascam CD-200BT or approved equal.

2.5 AUDIO POWER AMPLIFIERS

- A. Provide Audio Power Amplifiers having the following:
 - 1. DriveCore Technology
 - 2. Configuration and control using HiQnet® Audio Architect™
 - 3. Supports Monitoring and control over TCP/IP
 - 4. Color LCD and front panel user interface for amplifier configuration, control, and monitoring
 - 5. Programmable GPIO (general purpose input/output) control port
 - 6. Digital signal processing (Input/output EQ filters, crossover, input/output delay, Level MAX TM limiters)

7. Support for importing of FIR filter coefficients
8. 20 device presets – 1 factory and 19 user
9. 96kHz/32-bit floating-point signal processing
10. Universal power supply with PFC for reduced current draw
11. Remote power off – Sleep mode activated via AUX port
12. 70Vrms/100Vrms direct drive capable
13. Each channel individually selectable for Low Z or High Z operation
14. Advanced protection circuits – Amplifier and loads are protected against shorted outputs, DC, mismatched loads, overheating, over/under-voltage, and high-frequency overload.
15. Three year, no-fault transferable warranty
16. Design Make: Facility audio amplifiers: Crown CDi 4/300 Drive Core series

2.6 EQUIPMENT RACK

- A. Provide a Floor Standing, lockable equipment rack.
- B. Rack shall be 16-gauge steel construction with 1/8" steel internal braces.
- C. Rack Overall dimensions shall be 22" W x 48.13" H x 27.0" D. Weight capacity shall be 2,500 lbs.
- D. Rackrail shall be constructed of 11-gauge steel with tapped 10-32 mounting holes in universal EIA spacing with black e-coat finish and marked rack spaces.
- E. Rack shall be of fully welded construction. Rack shall be constructed of the following materials: top and bottom shall be 16-gauge steel, horizontal braces shall be 16-gauge steel welded to integral structural side panels of 16-gauge steel giving an 1/8" thick structure, rear door shall be 18-gauge steel, all structural elements shall be finished in a durable black powder coat.
- F. Rack shall have removable split rear knockout panels with 1/2", 3/4", 1", and 1-1/2" electrical knockouts installed in base and a removable rear knockout panel with 1/2", 3/4", 1", and 1-1/2" electrical knockouts and BNC knockouts for antennae installed in top.
- G. Rack shall include solid locking rear door standard and removable key locked side panels with recessed lift handles.
- H. Rack shall be UL Listed in the US and Canada. Rack shall be GREENGUARD Indoor Air Quality Certified for Public buildings. Grounding and bonding stud shall be 1/4-20 threaded, installed in base of enclosure.
- I. Rack shall be warrantied to be free from defects in materials or workmanship for the lifetime of the rack.
- J. Design Make: Middle Atlantic WRK series, with locking, plexi-smoked front door, equipment shelves, storage drawer and power strips, or approved equal.

2.7 LOUDSPEAKERS - CEILING STYLE FOREGROUND SPEAKER

- A. The loudspeaker system shall consist of a 6.5 in low frequency transducer, low frequency voice coil shall be 1 in in diameter, .75 in titanium film tweeter, and frequency dividing network installed in a ported enclosure.
- B. The magnetic assemblies shall use ferrite magnets, with integral shielding of the external magnetic field.
- C. The frequency dividing network shall have a crossover frequency of 3 kHz and shall utilize polypropylene bypass capacitors to reduce hysteresis effects on the signal.
- D. Performance: sensitivity (SPL at 1 m (3.3 ft) with 2.83 V input, swept from 500 Hz to 1.5 kHz) shall be at least 89 dB SPL.
- E. Frequency response: +-3 dB from 75 Hz to 20 kHz.
- F. Rated power capacity shall be at least 75 watts continuous pink noise.
- G. Backcan: Formed steel Baffle/Rim: Medium impact polystyrene, fire rated UL94V-0.
- H. Overall dimensions 8.3in by 9.9 in by 7.5 in deep.
- I. Finish shall be white metal grille.
- J. Design Make: JBL Model Control 26c/ct, with 70 v matching transformer.

2.8 PROGRAMMING

- A. Provide all programming required to control all devices and equipment as required by Owner.
- B. Provide all programming modifications requested by the owner for a period of thirty (30) days after substantial completion at no additional cost.

2.9 CABLING

- A. Provide all cabling required for the complete operation of the system. Install all cables in raceways provided by the Division 26 sub-contractor.
- B. Provide Teflon coated plenum rated cable where required by code.
- C. All cable shall be furnished by the control system manufacturer, or shall be verified by the manufacturer as acceptable for use.
- D. Provide signal extenders/converters where required.

2.10 MICELLANEOUS EQUIPMENT

- A. Provide all required power supplies, interconnect panels and equipment required for the complete operation of the system and interconnection with the audio and visual equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Cable:

1. Install all wiring conduits provided by the Division 26 sub-contractor.
2. Provide wiring types and signs as recommended by the manufacturer.
3. All Contract Documents are schematic. The system supplier shall incorporate their wiring requirements on the system drawings. The Contractor in conjunction with the system manufacturer shall be responsible for complete wiring requirements.
4. The Contractor shall be responsible for replacing all cables that do not pass required bandwidth and throughput tests.
5. Label all cables at both ends.

B. Equipment and Devices:

1. Install all devices where shown on drawings.
2. Install rack mounted equipment in 19 in. fixed racks leaving a minimum of 30 in. of access space on sides of rack and 36 in. in front of rack.
3. Provide surge suppression per Manufacturer's requirements for all equipment.
4. Provide all power outlets and plug strips required for system operation but not shown on plans.

3.2 PROGRAMMING

- A. One month prior to job completion, the supplier shall arrange a meeting with the Owner at which time the supplier shall configure the system per the Owner's direction. Provide three (3) electronic copies of program.
- B. Provide all Owner requested software modifications for a period of one calendar month after substantial completion at no additional cost to the Owner.

3.3 COORDINATION WITH OTHER TRADES

- A. Coordinate all cable installations with the Division 26 Electrical Subcontractor. Install cables in raceways provided by this Contractor.
- B. Coordinate all power connections to audio/visual control equipment with the Division 26 Electrical Subcontractor. Provide wiring diagrams depicting all connections.

- C. Coordinate installation of the presenter control interface with millwork supplier.

3.4 TRAINING AND INSTRUCTION

- A. Provide 8 hours of instruction to 3 Owner personnel regarding system set up configuration and management.
- B. Provide two (2) hour classes explaining control system use. Two (2) months after initial training sessions repeat with (2) hour session.

3.5 WARRANTY

- A. All standard manufacturers' warranties shall apply.
- B. The installation shall be warranted for one (1) year.
- C. Provide technical support at no charge to the customer for a period of (1) year after system has been commissioned.
- D. Make available an extended warranty to the customer.

END OF SECTION 274116.10

SECTION 275225 DIGITAL SIGNAGE SYSTEM - INFRASTRUCTURE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide labor, materials, equipment and services to perform operations required for the infrastructure cabling plant for a digital signage system and related Work as required in the Contract Documents.

1.3 QUALITY ASSURANCE

- A. All methods of construction, details of workmanship that are not specifically described or indicated in the contract documents, shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory.
- B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- C. Installation shall be accordance with NFPA 70 (National Electrical Code), state codes, local codes, and requirements of authority having jurisdiction.
- D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.
- E. Each item shall bear the UL Label.
- F. The system provider must:
 - 1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.
 - 2. Demonstrate that they have successfully installed these systems, utilizing their standard products, for a period of five (5) years.
 - 3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours per day; 365 days per year and staff must be adequate to respond within 2 hours of an emergency call.

4. Maintain adequate spare parts inventory to provide both normal and emergency service.
5. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
6. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, set-up, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and where appropriate, certifications in the proper training and use of the tools and/or equipment.
7. Provide all system programming to deliver a customized system to the Owner ready for use.
 - a. All system programming is to be completed to the satisfaction of the Owner. If after preliminary use of the system, and/or training, the increased understanding of the system's features and capabilities necessitates reprogramming to any extent, it is to be performed at no additional cost.

1.4 SUBMITTALS

- A. All items of equipment and accessories specified under this section.
- B. Include:
 1. Complete equipment list including quantities.
 2. Catalog descriptive literature for all equipment.
 3. Riser Wiring Diagram showing all devices, wire quantities and sizes.
 4. Typical Terminal Wiring Diagram for each type of device.
 5. Complete equipment configuration.
 6. Test reports as called for.

1.5 SYSTEM DESCRIPTION

- A. Digital signage display locations shall provide information regarding activities and other facility information. Graphics must be included in the information presented to the public. A customized initial screen with the facility logo will be included, with an animated attract loop.
- B. Updating of information shall be from an existing remote data entry workstation.
- C. System shall not solely depend on any single subsystem for operation of directories.
- D. System basis shall be digital ATSC content, or encoded streamed IP content delivery, to remote decoders at the display locations.
 1. System shall be capable of displaying real time information, such as weather information, news ticker, and emergency notifications.

- E. Shall have capabilities of adding directories or information without altering the initial system.
- F. Coordinate expansion of existing system, licensing, and capabilities with Owner's network administrator.

PART 2 - PRODUCTS

2.1 DIGITAL SIGNAGE CABLING

- A. Digital signage infrastructure cabling shall consist of:
 - 1. A CAT6a cable routed from local IDF, to each field display location.
 - 2. A RG-59 coaxial cable routed from local IDF, to each field display location.
 - 3. Leave a 15' coil of supported cable at IDF locations.
 - 4. At field locations: Provide a recessed, RJ-45 and female "F" connector installed on a single gang backbox.
 - 5. All cabling runs shall be supported, terminated, labeled and tested. Provide test results to Engineer for review.
 - 6. Contractor shall install cabling using methods of installation as defined in the Communications General Spec Section 270510.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Contractor shall provide all wiring to include power, data, raceway, supports, termination, testing, labeling, etc.
- B. Follow the manufacturers written procedures for installation.
- C. Contractor shall provide all nuts, bolts, channel and any other hardware necessary for a complete installation.
- D. Provide training for a minimum of five owner designated personnel for a period of eight (8) hours. Training shall cover all aspects of the installation.
- E. The manufacturer shall provide a minimum warranty of one (1) year after acceptance by the Owner.

END OF SECTION 275225

SECTION 280500 BASIC ELECTRONIC SAFETY AND SECURITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these contract documents. All materials and equipment shall be installed in accordance with the manufacturer's recommendations.

1.3 LICENSING

- A. The Contractor shall hold a license to perform the work as issued by the authority having jurisdiction.
- B. Plumbing contract work shall be performed by, or under, the direct supervision of a licensed master plumber.
- C. Electrical contract work shall be performed by, or under, the direct supervision of a licensed electrician.

1.4 PERMITS

- A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges. Provide certificate of approval from the City of Schenectady prior to request for final payment.
- B. Provide electrical inspection certificate of approval from Middle Department Inspection Agency, Commonwealth Inspection Agency, or an Engineer approved Inspection Agency prior to request for final payment.

1.5 CODE COMPLIANCE

- A. Provide work in compliance with the following:
 - 1. Building Code of Oklahoma State.
 - 2. Mechanical Code of Oklahoma State.

3. Plumbing Code of Oklahoma State.
4. Fuel Gas Code of Oklahoma State.
5. Fire Code of Oklahoma State.
6. Energy Conservation Construction Code of Oklahoma State.
7. Oklahoma State Department of Labor Rules and Regulations.
8. Oklahoma State Department of Health.
9. National Electrical Code (NEC).
10. Occupational Safety and Health Administration (OSHA).
11. Local Codes and Ordinances.
12. Life Safety Codes, NFPA 101.
13. City of Schenectady Plumbing Department.
14. Oklahoma State Education Department Manual of Planning Standards.
15. ASPE/ANSI 45-2013: Siphonic Roof Drainage.

1.6 GLOSSARY

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|--------|---|
| ACI | American Concrete Institute |
| AGA | American Gas Association |
| AGCA | Associated General Contractors of America, Inc. |
| AIA | American Institute of Architects |
| AISC | American Institute of Steel Construction |
| AFBMA | Anti-Friction Bearing Manufacturer's Association |
| AMCA | Air Moving and Conditioning Association, Inc. |
| ANSI | American National Standards Institute |
| ARI | Air Conditioning and Refrigeration Institute |
| ASHRAE | American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc. |
| ASME | American Society of Mechanical Engineers |
| ASPE | American Society of Plumbing Engineers |
| ASTM | American Society for Testing Materials |
| AWSC | American Welding Society Code |
| AWWA | American Water Works Association |
| FM | Factory Mutual Insurance Company |
| IBR | Institute of Boiler & Radiation Manufacturers |
| IEEE | Institute of Electrical and Electronics Engineers |
| IRI | Industrial Risk Insurers |
| NEC | National Electrical Code |
| NEMA | National Electrical Manufacturer's Association |
| NESC | National Electrical Safety Code |

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| NFPA | National Fire Protection Association |
| OK/DEQ | Oklahoma State Department of Environmental Quality |
| SBI | Steel Boiler Institute |
| SMACNA | Sheet Metal and Air Conditioning Contractors National Association |
| UFPO | Underground Facilities Protective Organization |
| UL | Underwriter's Laboratories, Inc. |
| OSHA | Occupational Safety and Health Administration |
| XL - GAP | XL Global Asset Protection Services |

1.7 DEFINITIONS

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| Acceptance | Owner acceptance of the project from Contractor upon certification by Owner's Representative. |
| As Specified | Materials, equipment including the execution specified/shown in the contract documents. |
| Basis of Design | Equipment, materials, installation, etc. on which the design is based. (Refer to the article, Equipment Arrangements, and the article, Substitutions.) |
| Code Requirements | Minimum requirements. |
| Concealed | Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade. |
| Coordination Drawings | Show the relationship and integration of different construction elements and trades that require careful coordination during fabrication or installation, to fit in the space provided or to function as intended. |
| Delegated-Design Services | (Performance and Design criteria for Contractor provided professional services). Where professional design services or certifications by a design professional are specifically required of a Contractor, by the Contract Documents. Provide products and systems with the specific design criteria indicated. If criteria indicated is insufficient to perform services or certification required, submit a written request for additional information to the Engineer. Submit wet signed and sealed certification by the responsible design professional for each product and system specifically assigned to the Contractor to be designed or certified by a design professional. Examples: structural maintenance ladders, stairs and platforms, pipe anchors, seismic compliant system, wind, structural supports for material equipment, sprinkler hydraulic calculations. |
| Equal, Equivalent, Equal To, Equivalent To, As Directed and As Required | Shall all be interpreted and should be taken to mean "to the satisfaction of the Engineer. |
| Exposed | Work not identified as concealed. |

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| Extract | Carefully dismantle and store where directed by Owner's Representative and/or reinstall as indicated on drawings or as described in specifications. |
| Furnish | Purchase and deliver to job site, location as directed by the Owner's Representative. |
| Inspection | Visual observations by Owner's site Representative. |
| Install | Store at job site if required, proper placement within building construction including miscellaneous items needed to affect placement as required and protect during construction. Take responsibility to mount, connect, start-up and make fully functional. |
| Labeled | Refers to classification by a standards agency. |
| Manufacturers | Refer to the article, Equipment Arrangements, and the article, Substitutions. |
| Prime Professional | Architect or Engineer having a contract directly with the Owner for professional services. |
| Product Data | Illustrations, standard schedules, performance charts, instructions, brochures, wiring diagrams, finishes, or other information furnished by the Contractor to illustrate materials or equipment for some portion of the work. |
| Provide (Furnish and Install) | Contractor shall furnish all labor, materials, equipment and supplies necessary to install and place in operating condition, unless otherwise specifically stated. |
| Relocate | Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use. |
| Remove | Dismantle and take away from premises without added cost to Owner, and dispose of in a legal manner. |
| Review and Reviewed | Should be taken to mean to be followed by "for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. |
| Roughing | Pipe, duct, conduit, equipment layout and installation. |
| Samples | Physical full scale examples which illustrate materials, finishes, coatings, equipment or workmanship, and establishes standards by which work will be judged. |
| Satisfactory | As specified in contract documents. |
| Shop Drawings | Fabrication drawings, diagrams, schedules and other instruments, specifically prepared for the work by the Contractor or a Sub-contractor, manufacturer, supplier or distributor to illustrate some portion of the work. |
| Site Representative | Owner's Inspector or "Clerk of Works" at the work site. |
| Submittals Defined (Technical) | Any item required to be delivered to the Engineer for review as requirement of the Contract Documents. The purpose of technical submittals is to demonstrate for those portions of the work for which a submittal is required, the manner in which the Contractor proposes to conform to the information given and design concepts expressed and required by the Contract Documents. |

1.8 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

- A. Provide submittals on all items of equipment and materials to be furnished and installed. Submittals shall be accompanied by a transmittal letter, stating name of project and contractor, name of vendor supplying equipment, number of drawings, titles, specification sections (name and number) and other pertinent data called for in individual sections. Submittals shall have individual cover sheets that shall be dated and contain: Name of project; name of prime professional; name of prime contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at under one cover sheet per specification section (e.g. valves, plumbing fixtures, etc.). Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Submittals will be given a general review only. Corrections or comments made on the Submittals during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner. If submitting hard copies, submit four (4) copies for review.
- B. If submittals are to be submitted electronically, all requirements in Item A apply. Submittals shall be emailed in PDF format to specific email address provided by the Construction Manager, General Contractor, Architect or Project Manager. Name of project shall be in subject line of email. Send emails to meBuff-RFI-Sub-Clerk@meengineering.com.
- C. Refer to Section 013300 - Submittal Procedures for additional requirements.

1.9 PROTECTION OF PERSONS AND PROPERTY

- A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.10 EQUIPMENT ARRANGEMENTS

- A. The contract documents are prepared using one manufacturer as the Basis of Design, even though other manufacturers' names are listed. If Contractor elects to use one of the listed manufacturers other than Basis of Design, submit detailed drawings, indicating proposed installation of equipment. Show maintenance clearances, service removal space required, and other pertinent revisions to the design arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace doorframes, access doors, walls, ceilings, or floors required to install other than Basis of Design. If revised arrangement submittal is rejected, revise and resubmit specified Basis of Design item which conforms to Contract Documents.

1.11 SUBSTITUTIONS

- A. If Contractor desires to bid on any other kind, type, brand, or manufacture of material or equipment than those named in specifications, secure prior approval. To request such approval, Contractor shall submit complete information comparing (item-for-item) material or equipment offered with design material or equipment. Include sufficient information to permit quick and thorough comparison, and include performance curves on same basis, capacities, power requirements, controls, materials, metal gauges, finishes, dimensions, weights, etc., of major parts. If accepted, an addendum will be issued to this effect ahead of bid date. Unless such addendum is issued, substitution offered may not be used.

1.12 UTILITY COMPANY SERVICES

- A. Plumbing Contractor shall make arrangements with utility for gas service to the Owner's distribution system. Provide service to the building as required by the Utility Company. Coordinate all activities between the Owner and Utility Company. The installation of the gas service shall comply with the published Utility Company standards. **PAY ALL UTILITY COMPANY CHARGES; INCLUDE CHARGES IN THE BASE BID.**

1.13 ROUGHING

- A. The Contract Drawings have been prepared in order to convey design intent and are diagrammatic only. Drawings shall not be interpreted to be fully coordinated for construction.
- B. Due to small scale of Drawings, it is not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in contract work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. **DO NOT SCALE** plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner's Representative for review. Obtain written approval for all major changes before installing.
- C. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Provide new materials, including new piping and insulation for relocated work.
- D. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner's Representative exact location of all equipment in finished areas, such as thermostat, fixture, and switch mounting heights, and equipment mounting heights. Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and electrical drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, sprinklers, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

- E. Before roughing for equipment furnished by Owner or in other contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not "rough in" services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
 2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner's Representative.

1.14 COORDINATION SHOP DRAWINGS

- A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of electronic drawing files or reproducible transparencies, drawn at not less than 1/4 in. scale. Such drawings will be required throughout all areas, for all Contracts. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical Equipment Rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:
1. Siphonic roof drainage is an engineered system, and priority must be given to the location and elevation of all siphonic roof drainage piping.
 2. The HVAC Contractor shall prepare the base plan coordination drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, sprinklers, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be redrawn.
 3. The HVAC Contractor shall provide reproducibles and/or prints and submit the base plan to all Contractors. Electronic drawing files may be furnished to the contractors which have the CAD capabilities required for their use.
 4. The Plumbing/Fire Protection Contractor shall draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
 5. The Electrical Contractor shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 in. on the base plan, indicating areas of conflict and suggested resolution.
 6. The General Construction Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.

7. The Construction Manager shall expedite all drawing work and coordinate to suit the overall construction schedule. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various contractors as to how to revise their drawings as required to eliminate installation interferences.
 8. If a given Contract proceeds prior to resolving conflicts, then if necessary, that Contract shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Contracts.
- B. The purpose of the coordination drawing process is to identify and resolve potential conflicts between Contracts, and between Contracts and existing building construction, before they occur in construction. Coordination drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these contract documents.

1.15 EQUIPMENT AND MATERIAL INSTALLATION

- A. Provide materials that meet the following minimum requirements:
1. Materials shall have a flame spread rating of 25 or less and a smoke developed rating of 50 or less, in accordance with NFPA 255.
 2. All equipment and material for which there is a listing service shall bear a UL label.
 3. Potable water systems and equipment shall be built according to AWWA Standards.
 4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
 5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.
- B. Exterior and wet locations shall utilize materials, equipment supports, mounting, etc. suitable for the intended locations. Metals shall be stainless steel, galvanized or with baked enamel finish as a minimum. Finishes and coatings shall be continuous and any surface damaged or cut ends shall be field corrected in accordance with the manufacturer's recommendations. Hardware (screws, bolts, nuts, washers, supports, fasteners, etc.) shall be:
1. Stainless steel where the associated system or equipment material is stainless steel or aluminum.
 2. Hot dipped galvanized or stainless steel where the associated system or equipment is steel, galvanized steel or other.

1.16 CUTTING AND PATCHING

- A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction Contract. Refer to General Conditions of the Contract for Construction, for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch cut or abandoned holes left by removals of equipment

or fixtures. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.17 PAINTING

- A. Paint all insulated and bare piping, pipe hangers and supports exposed to view in mechanical equipment rooms, penthouse, boiler rooms and similar spaces. Paint all bare piping, ductwork and supports exposed to the out-of-doors with rust inhibiting coatings. Paint all equipment that is not factory finish painted (i.e. expansion tanks, etc.).
- B. All painting shall consist of one (1) prime coat and two (2) finish coats of non-lead oil base paint, unless otherwise indicated herein. Provide galvanized iron primer for all galvanized surfaces. All surfaces must be thoroughly cleaned before painting. Review system color coding prior to painting with the Owner's Representative or Architect.
- C. All items installed after finished painting is completed and any damaged factory finish paint on equipment furnished under this contract must be touched up by the Contractor responsible for same.
- D. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the Specifications.
- E. All primers and paint used in the interior of the building shall comply with the maximum Volatile Organic Compound (VOC) limits called for in the current version of U.S. Green Building Council LEED Credits EQ 4.1 and EQ 4.2.
- F. Refer to Division 9 - Finishes, for additional information.

1.18 CONCEALMENT

- A. Conceal all contract work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.19 CHASES

- A. New Construction:
 - 1. Certain chases, recesses, openings, shafts, and wall pockets will be provided as part of General Construction Contract. Mechanical and Electrical Contracts shall provide all other openings required for their contract work.
 - 2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.

3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 in. above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for contract work, unless provided by General Construction Contractor.

1.20 PENETRATION FIRESTOPPING

A. Fire-Stopping for Openings Through Fire and Smoke Rated Wall and Floor Assemblies:

1. Provide materials and products listed or classified by an approved independent testing laboratory for "Penetration Fire-Stop Systems". The system shall meet the requirements of "Fire Tests of Penetrations Fire-Stops" designated ASTM E814.
2. Provide fire-stop system seals at all locations where piping, tubing, conduit, electrical busways/cables/wires, ductwork and similar utilities pass through or penetrate fire rated wall or floor assembly. Provide fire-stop seal between sleeve and wall for drywall construction.
3. The minimum required fire resistance ratings of the wall or floor assembly shall be maintained by the fire-stop system. The installation shall provide an air and watertight seal.
4. The methods used shall incorporate qualities which permit the easy removal or addition of electrical conduits or cables without drilling or use of special tools. The product shall adhere to itself to allow repairs to be made with the same material and permit the vibration, expansion, and/or contraction of any items passing through the penetration without cracking, crumbling and resulting reduction in fire rating.
5. Plastic pipe/conduit materials shall be installed utilizing intumescent collars.
6. Provide a submittal including products intended for use, manufacturer's installation instructions, and the UL details for all applicable types of wall and floor penetrations.
7. Fire-stopping products shall not be used for sealing of penetrations of non-rated walls or floors.

B. Acceptable Manufacturers:

1. Dow Corning Fire-Stop System Foams and Sealants.
2. Nelson Electric Fire-Stop System Putty, CLK and WRP.
3. S-100 FS500/600, Thomas & Betts.
4. Carborundum Fyre Putty.
5. 3-M Fire Products.
6. Hilti Corporation.

1.21 NON-RATED WALL PENETRATIONS

- ##### A.
- Each trade shall be responsible for sealing wall penetrations related to their installed work, including but not limited to ductwork, piping, conduits, etc. See individual specification sections for requirements.

1.22 PENETRATION FIRE STOPPING

- A. See Specification Section 078400 07841, Penetration Firestopping, for project wide fire stopping information.

1.23 SUPPORTS

- A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support mechanical/electrical work as determined by manufacturer and the Engineer. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.
- B. Equipment, piping, conduit, raceway, etc. supports shall be installed to minimize the generation and transmission of vibration.
- C. Materials and equipment shall be solely supported by the building structure and connected framing. Gypboard, ceilings, other finishes, etc. shall not be used for support of materials and equipment.

1.24 ACCESS PANELS

- A. Provide access panels for required access to respective Contract work. Location and size shall be the responsibility of each Contract. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two cam locks. Provide proper frame and door type for various wall or ceiling finishes. Access panels shall be equal to "Milcor" as manufactured by Inland Steel Products Co., Milwaukee, Wisconsin. Provide Contractor for General Trades with a set of architectural plans with size and approximate locations of access panels shown.

1.25 CONCRETE BASES

- A. Provide concrete bases for all floor mounted equipment. Provide 3,000 lb. concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 6 in. high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.26 PLUMBING EQUIPMENT CONNECTIONS

- A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.
- B. Install controls and devices furnished by others.
- C. Refer to Contract Documents for roughing schedules, and equipment and lists indicating scope of connections required.
- D. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, as required.

1.27 ELECTRICAL EQUIPMENT CONNECTIONS

- A. Provide complete power connections to all electrical equipment. Provide control connections to equipment. Heavy duty NEC rated disconnect ahead of each piece of equipment. Ground all equipment in accordance with NEC.

1.28 STORAGE AND PROTECTION OF MATERIALS AND EQUIPMENT

- A. Store Materials on dry base, at least 6 in. aboveground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.
- B. Refer to Section 016000 - Product Requirements for additional information.

1.29 FREEZING AND WATER DAMAGE

- A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no change in contract, any such damage to equipment, systems, and building. Perform first seasons winterizing in presence of Owner's operating staff.

1.30 LUBRICATION CHART

- A. Provide lubrication chart, 8-1/2 in. x 11 in. minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing and Electrical Trades add contract items to the chart provided by the Heating Trade or provide separate charts.

1.31 OWNER INSTRUCTIONS

- A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner's personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.32 OPERATION AND MAINTENANCE MANUALS

- A. Prepare three (3) Operation and Maintenance Manuals. Include in each O&M Manual, a copy of each approved Shop Drawing, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of installing contractor and of supplier manufacturer Representative and service agency for all major equipment items. Provide a table of contents page and dividers based upon specification section numbers. Bind above items in a three ring binder with name of project on the cover. Deliver three (3) copies to Owner's Representative for review before request for final acceptance.
- B. Operation and Maintenance Manuals shall also be submitted electronically, in PDF format on CD or flash drive.

1.33 RECORD DRAWINGS

- A. The Contractor shall obtain at his expense one (1) set of construction Contract Drawings, (including non-reproduction black and white prints and one set of reproducible mylars or electronic files) for the purpose of recording as-built conditions.
- B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.
- C. It shall be the responsibility of the Contractor to mark EACH sheet of the contract documents in red pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the work, the complete set of red marked contract documents, plus all approved field sketches and diagrams shall be submitted to the engineer and used in preparation of the record drawings.

- D. A complete set of red marked contract drawings shall be submitted, at one time, as the "Record" set. If there are no changes to a specific drawing, the contractor shall write "NO CHANGES" on that drawing. ALL drawings shall be included in the "Record" set.
- E. The complete set of red marked Contract Documents, completed reproducible mylar or electronic files shall be certified by the Contractor as reflecting record conditions and submitted to the engineer for review.
- F. Once the as-built drawings have been approved, the Contractor shall have the set scanned or converted to electronic files and submit to the Engineer as the "Record Set".

1.34 FINAL INSPECTION

- A. Upon completion of all Engineering Site Observation list items, the Contractor shall provide a copy of the Engineering Site Observation Report back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final review.

1.35 TEMPORARY HEAT

- A. Refer to the General Conditions of the Contract for Construction and Supplemental General Conditions.
- B. Systems and equipment installed as part of this project shall not be used for temporary

1.36 TEMPORARY FACILITIES

- A. Refer to the Division 1 Sections, General Conditions and Supplemental General Conditions.

1.37 CLEANING

- A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:
 - 1. Thoroughly clean entire installation, both exposed surfaces and interiors.
 - 2. Remove all debris caused by work.
 - 3. Remove tools, surplus, materials, when work is finally accepted.

1.38 SYSTEM START-UP AND TESTING

- A. All new heating and ventilating systems shall be started up and operated at normal operating temperature for a period of 24 hours to "bake-off" the equipment. The associated ventilation system shall run on 100% outside air during the bake-off for an additional eight hours to purge the building. This work shall be completed prior to occupancy or on a Saturday, with the Contractor responsible for being on site during the entire purge and bake-off operation.

1.39 TRANSFER OF ELECTRONIC FILES

- A. M/E Engineering, P.C. will provide electronic files for the Contractor's use in the preparation of record drawings related to the project, subject to a \$50.00 charge per drawing file and the following terms and conditions:
1. The Contractor shall submit a formal request for electronic drawing files on the M/E Engineering, P.C. website, by visiting www.meengineering.com/contractor_request.php.
 2. M/E Engineering, P.C.'s electronic files will be exported from MicroStation into DWG/DXF files that are compatible with AutoCad as requested. M/E Engineering, P.C. makes no representation as to the compatibility of these files with the Contractor's hardware or the Contractor's software beyond the specific release of the referenced specifications.
 3. Data contained on these electronic files is part of M/E Engineering, P.C.'s instruments of service shall not be used by the Contractor or anyone else receiving data through or from the Contractor for any purpose other than as convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to M/E Engineering, P.C. The Contractor agrees to make no claim and hereby waive, to the fullest extent permitted by law, any claim or cause of action of any nature against M/E Engineering, P.C., its officers, directors, employees, agents or sub-consultants which may arise out of or in connection with the Contractor's use of the electronic files.
 4. Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold harmless, M/E Engineering, P.C. from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the Contractor's use of these electronic files.
 5. These electronic files are not contract documents. Significant difference may arise between these electronic files and corresponding hard copy contract documents due to addenda, change orders or other revisions. M/E Engineering, P.C. makes no representation regarding the accuracy or completeness of the electronic files the Contractor receives. In the event that a conflict arises between the signed contract documents prepared by M/E Engineering, P.C. and electronic files, the signed contract documents shall govern. The Contractor is responsible for determining if any conflicts exist. By the Contractor's use of these electronic files the Contractor is not relieved of the Contractor's duty to comply with the contract documents, including and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, field verify conditions and coordinate the Contractor's work with that of other contractors for the project.

1.40 VIDEO RECORDING OF TRAINING SESSIONS

- A. The contractor shall video record all training sessions required by their discipline. Video shall be in DVD format and two (2) copies submitted to the Owner. DVD to be individually marked with training session name, installing Contractor and date of training.

END OF SECTION 280500

SECTION 281300 CARD ACCESS CONTROL SYSTEM - INFRASTRUCTURE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SCOPE OF WORK

- A. Provide conduits, back boxes, infrastructure cabling and cabling support devices, for future installation of the Owner provided access control system. Cabling shall be routed from select door entrance locations, to the access control panel room location as shown on the contract documents.
- B. Entrances shall be cabled to accommodate the following field devices: Card reader location, electric strike, request to exit sensor, local alarm and door position switch.

1.3 QUALITY ASSURANCE

- A. All methods of construction and details of workmanship that are not specifically described or indicated in the Contract Documents shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- B. Installation shall be in accordance with NFPA-70 (National Electrical Code), state codes, local codes, and requirements of authority having jurisdiction.
- C. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.
- D. Each item shall bear the UL Label.

1.4 WIRING

- A. All wiring/cabling shall be as specified herein and shall meet all the requirements of the National, State and Local Electric Codes.
- B. All wires shall be color coded and tagged at all junction and termination points and shall be tested free from grounds or crosses between conductors.

1.5 INSTALLATION

- A. Preparatory work required to accommodate the installation (i.e., conduit, junction and pull boxes, outlet boxes, brackets, and all conduit fittings and accessories including power outlets as required) shall be furnished and installed by the Electrical Contractor.
- B. The installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in this type of work.

1.6 SUBMITTALS

- A. Submittals Package: Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.
- B. Include:
 - 1. Bill of Materials.
 - 2. Composite wiring and/or schematic diagrams of the complete system as proposed to be installed (standard diagrams will not be accepted).

PART 2 - PRODUCTS

2.1 SYSTEM CABLING

- A. All cabling shall meet manufacturer's requirements for wire gauge, shielding and number of conductors. Jacket color for all access control cabling shall be yellow.
- B. Unless otherwise directed by Manufacturer, provide the following cable type between devices:
 - 1. Door Header to Panel - max distance 500 feet - 18 AWG, 6 conductor, shielded.

2.2 CABLE LABELING

- A. Provide labels at the ends of each cable being provided, to include both field and access control panel locations.
- B. Each label shall identify the doorway entrance that will be controlled, and the room location of the access control panel serving the doorway entrance.
- C. The Contractor shall utilize Interlink-Label for Windows labeling software or approved equal.
- D. Labels shall be installed in a workmanlike manner and shall be completely covered with clear shrink wrap tubing.
- E. Verify color of label and size of font prior to completion. Provide samples as required.

- F. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers or those indicated on the blueprints.
- G. Contractor shall record each label on all record drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. After installation of wiring and apparatus has been completed, all cabling shall be tested by the Contractor to insure continuity, proper splicing, freedom from grounds (except "made" grounds and those required for protection), and insulation resistance in accordance with UL requirements and electrical regulations. The Contractor shall furnish and use suitable instruments such as ammeters, voltmeters, meggers, scanners, etc.

3.2 INSTALLATION

- A. All cabling will be done with a Teflon-coated fire-retardant sheathing approved for use in plenums.
- B. All cabling shall be installed in a conduit system. Refer to Specification Section 270510 - Communications, General.
- C. Provide adequate equipment for installation of cable. Pull all cables in such a manner as not to overstress or stretch any cable, and use precautions as not to score, cut, twist or damage the protective covering of insulation.
- D. Cables shall be handled and placed in such a manner as to avoid kinks and other sheath deformities. Minimum bending radius of all cables shall be 10 times the diameter of the cable. Cable kinked or flattened shall not be used. Lead sleeves or duct splices shall not be permitted.
- E. Cables shall be installed parallel or perpendicular to the building lines.
- F. In general, all wiring will be fully concealed in all facilities.
- G. Wire and cable shall not be supported from electrical conduits or mechanical piping.
- H. All equipment shall be properly mounted and anchored. All holes or voids caused by the Contractor shall be patched.
- I. Install system in accordance with the Company's printed instructions.

3.3 SYSTEM GROUNDINGS

- A. Provide a #6 bare grounding conductor from the equipment enclosure to the main building service ground. Each gas tube protector shall also be connected to ground with a #6 insulated copper conductor.

END OF SECTION 281300

SECTION 282300 I.P. CAMERA SURVEILLANCE SYSTEM - INFRASTRUCTURE CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

- A. Provide conduits, back boxes, infrastructure cabling and cabling support devices, for future installation of the Owner provided IP Camera surveillance system. Cabling shall be routed from select camera locations, to the data room location as shown on the contract documents. Leave 10 ft. cable coiled neatly at camera location.
- B. Parking area camera locations shall be cabled to accommodate the following field devices: Fiber to copper media adapters.

1.3 QUALITY ASSURANCE

- A. All methods of construction and details of workmanship that are not specifically described or indicated in the Contract Documents shall be subject to the control and approval of the Owner's Representative. Equipment and materials shall be of the quality and manufacture indicated in their respective sections of the specifications. The equipment specified is based upon the acceptable manufacturers listed. Equipment types, device ratings, dimensions, etc. correspond to the nomenclature dictated by those manufacturers. All equipment shall be tested at the factory.
- B. Unless specified elsewhere, standard factory inspection and operational tests will be acceptable.
- C. Installation shall be accordance with NFPA-70 (National Electric Code), National Electric Safety Code (NESC), state codes, local codes, and requirements of authority having jurisdiction.
- D. Equipment shall be designed, manufactured, assembled, and tested in accordance with the latest revisions of applicable published ANSI, NEMA and IEEE Standards.
- E. Each item shall bear the UL Label.
- F. The system provider must:
 - 1. Provide equipment from manufacturers for which they maintain a contract, distributorship, are an agent, or other formal arrangement for which documentation can be produced showing authority to sell and service the equipment in this territory.

2. Demonstrate that they have successfully installed these systems utilizing their standard products for a period of five (5) years.
3. Maintain a service organization to provide both normal and emergency service. Emergency service must be available 24 hours/day, 365 days/year, and staff must be adequate to respond within two (2) hours of an emergency call.
4. Maintain adequate spare parts inventory to provide both normal and emergency service.
5. Employ service technicians who are trained in accordance with the systems manufacturer's recommendations.
6. Own and demonstrate proficiency in the use of the required test equipment, tools, etc. for the proper installation, setup, testing and maintenance of the system. If requested, must provide a listing of tools and/or equipment and, where appropriate, certifications in the proper training and use of the tools and/or equipment.

1.4 GENERAL DESCRIPTION

- A. The work included in this section is shown on the drawings or described in the specifications and consists of furnishing all labor, material, services, and skilled supervision necessary for the construction, erection, installation, and connection of all circuits, apparatus, and equipment specified herein or shown on the drawings in a first class, workmanlike manner, and its delivery to the Owner ready for use.
- B. Each part of work is to be complete in detail and operable in unison with all other sections, to constitute a completely installed video surveillance system cabling infrastructure, and connections of same as shown on drawings and described in the specifications.
- C. Work in this section includes:
 1. Outlining the requirements for complete and satisfactory operating systems.
 2. The Contractor and system provider shall do everything necessary to provide thoroughly satisfactory and working systems, including furnishing and installing all items required to complete the work, whether specifically called for or not. The Contractor shall obtain all wiring requirements from the system manufacturer prior to building and include in his bid all wiring as recommended by the manufacturer.
 3. The Contractor shall furnish and install all necessary raceways and outlet boxes for installation of the video surveillance system cabling infrastructure, including furnishing and installing all raceways required to complete the work.
 4. All video surveillance system cabling shall be as specified herein.
 5. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.
 6. All work in conjunction with the video surveillance system installation shall comply with all the provisions of the NEC, all local and national codes, and authorities having jurisdiction.

- D. Intent:
 - 1. Provide conduit system, cabling and back boxes to camera locations identified on the drawings to allow for installation of cameras.

1.5 SCOPE OF I.P. CAMERA SURVEILLANCE SYSTEM WORK

- A. Provide outlet boxes, raceways, and system cabling from the local data rack to each camera location indicated on the drawings. All cabling shall be installed in a conduit system. Refer to Section 270510 - "Communications, General" for raceway type. Provide one (1) Cat 6 cable to each camera location.
- B. Terminate all Cat 6 cabling at I.P. camera surveillance system patch panel in the data rack indicated on the drawings. Provide RJ-45 connections on both ends of cable.
- C. Test all systems cabling.

PART 2 - PRODUCTS

2.1 I.P. CAMERA SURVEILLANCE SYSTEM CABLE

- A. Systems cabling to each facility camera location shall be one (1) Cat 6 UTP with a black PVC jacket. Provide with RJ-45 jack at each end. Provide a dedicated patch panel for I.P. camera surveillance system at rack. Terminate at I.P. camera surveillance patch panel at rack location as indicated on drawing.
- B. System cabling to parking area cameras shall be six (6) strands, 50 micron, multi-mode fiber optic cable.
- C. At parking area locations: Provide a pole mount weather proof enclosure designed to house the media converter device.
- D. Provide a UV resistant, 3' Cat 6 patch cable to connect media converter to (future) IP camera.
- E. All cabling runs shall be supported, terminated, labeled and tested. Provide test results to Engineer for review.
- F. Contractor shall install cabling using methods of installation as defined in the Communications General Spec Section 270510.

2.2 CABLE LABELING

- A. Provide labels at the ends of each cable being provided, to include both camera field end, and data room location.
- B. Each label shall identify the camera field end location, and data room location.

- C. The Contractor shall utilize Interlink-Label for Windows labeling software or approved equal.
- D. Labels shall be installed in a workmanlike manner and shall be completely covered with clear shrink wrap tubing.
- E. Verify color of label and size of font prior to completion. Provide samples as required.
- F. Labels shall correspond to the room/names/numbers upon completion of the project. Contractor shall not necessarily utilize existing room/names/numbers of those indicated on the blueprints.
- G. Contractor shall record each data port label on all record drawings.

PART 3 - EXECUTION

3.1 SYSTEM WIRING

- A. Cables shall not be supported from electrical conduits, mechanical piping or ductwork. All cabling shall be installed in a conduit system.
- B. Wiring shall conform to NEC Article 725.
- C. All outlet boxes required as a part of the mounting arrangement for devices shall be installed in accordance with the manufacturer's instructions.
- D. All wires and cables shall be color coded and tagged at all junction and termination points and shall be tested free from grounds or crosses between conductors.
- E. Raceways shall be sized to suit the number of wires required by the system supplier's equipment being installed. Size raceways and associated boxes as required by the NEC limiting fill to 40%, unless otherwise indicated or further reduced by manufacturer's representative's recommendations. Terminate all conduits with bushings.
- F. The video surveillance system drawings are schematic and locate devices only. The Contractor shall be responsible for complete wiring requirements and conduit sizes.

3.2 INSTALLATION

- A. Preparatory work required to accommodate the video surveillance system installation (i.e. conduit, junction and pull boxes, outlet boxes, brackets and all conduit fittings and accessories, including power outlets as required), shall be furnished and installed in accordance with applicable local, state and national codes.
- B. The installation shall be accomplished in a professional manner by qualified personnel regularly engaged in and experienced in video surveillance system type of work.

3.3 SYSTEM TEST, ADJUSTMENTS AND APPROVAL

- A. Contractor shall conduct an acceptance test of every system cable. All tests shall be repeated until all defects have been remedied. Testing shall be conducted as specified in Section 270510, Communications, General.
- B. The video surveillance infrastructure shall be physically inspected by the Owner's Representative to assure that all equipment is installed in a neat and workmanlike manner.
- C. Provide two (2) copies of Operation and Maintenance Manuals to Owner.

3.4 WARRANTY

- A. All equipment shall be provided with a one (1) year manufacturer's warranty.

END OF SECTION 282300

SECTION 312311

EARTHWORK FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. The work covered by this Section consists of furnishing all plant, labor, equipment, appurtenances and material in performing all operations, hauling, placing, spreading, watering, processing, compacting and shaping earth sections, within the building limits, complete in place in accordance with the Project Manual and Drawings.

1.2 RELATED WORK ELSEWHERE

- A. Clearing - Section 31 10 00
- B. Under-Slab Vapor Retarder – Section 07 26 00
- C. General Foundation Notes on Drawings.
- D. Project Soils Report – shall be completely reviewed and understood by the contractor. In case of conflict or omission, the Project Soils Report shall govern.

1.3 SUBSURFACE SOIL DATA

- A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. This is not a warranty of conditions, the Contractor is expected to examine the site and determine for himself the character of materials to be encountered.
- B. No additional allowance will be made for rock removal, site clearing and grading, filling, compaction, disposal, or removal of any unclassified materials.

1.4 REFERENCES

- A. ASTM International, latest version of the following:
 - 1. ASTM D 1556 Standard Test Method for Density of Soil in Place by the Sand-Cone Method
 - 2. ASTM D 698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
 - 3. ASTM D 4318 Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
 - 4. ASTM D 6938 Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

1.5 SUBMITTALS

- A. Submit copies of materials certificates and test results for materials in accordance with type of tests, frequencies and remarks as outlined in the sampling and testing schedule.

1.6 TESTING AND INSPECTION

- A. General: The Owner shall employ the services of a registered, licensed Geotechnical Engineer to observe all controlled earthwork soil testing. The testing laboratory shall provide continuous on-site observation by experienced personnel during construction of fill material. The Contractor shall notify the testing laboratory at least two working days in advance of any field operations of controlled earthwork, or of any resumption of operations after stoppages.
- B. Report of Field Density Tests
 - 1. The Geotechnical Engineer shall submit, daily, the results of field density tests required by these specifications.
- C. Costs of Tests and Inspection
 - 1. The cost of testing, inspecting and engineering, as specified in this section of the specifications, shall be borne by the Owner.
- D. Lines and Grades: Alignment and grade of all elements shall be made on true tangents and curves. Grades shall conform to the elevations indicated on Drawings, with minor adjustments, to provide a smooth approach at building lines, at connections to existing paving and to provide proper drainage. Correct irregularities at no cost to the Owner.

1.7 WEATHER LIMITATIONS

- A. Controlled fill shall not be constructed when the atmospheric temperature is below 35 degrees F. When the temperature falls below 35 degrees, it shall be the responsibility of the Contractor to protect all areas of completed work against any detrimental effects of ground freezing by methods approved by the testing laboratory. Any areas that are damaged by freezing shall be reconditioned, reshaped, and compacted by the Contractor in conformance with the requirements of this specification without additional cost to the Owner.

PART 2 - PRODUCTS

2.1 STRUCTURAL FILL MATERIAL

- A. Material shall consist of soils that conform to the following physical characteristics:

| | |
|--------------|-----------------|
| Sieve Size | Percent Passing |
| Sq. Openings | By Weight |
| 6 inch | 100 |

| | |
|---------|----------|
| 3 inch | 90 - 100 |
| No. 4 | 50 - 100 |
| No. 200 | 10 - 50 |

- B. The plasticity index of the material to be used for fill or backfill, as determined in accordance with ASTM D 4318 shall not exceed 10.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clearing and Grubbing: Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled offsite or stockpiled for subsequent use in landscaped areas or non-structural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

3.2 CONSTRUCTION AREA TREATMENT

- A. Site Preparation - Fill Areas: Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined in accordance with ASTM D 1557. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.
- B. Site Preparation - Cut Areas: Following excavation to rough grade all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D 1557.

3.3 EQUIPMENT AND METHODS

- A. In areas not accessible to heavy equipment, distribute by and compact with hand operated vibratory compactors.

3.4 BORROW

- A. The Contractor shall provide sufficient material for fill to the lines, elevations and cross sections as shown on the contract drawings from borrow areas.
- B. The Contractor shall obtain from the Owners of said borrow areas the right to excavate material, shall pay all royalties and other charges involved, and shall pay all expenses in developing the source including the cost of right-of-way required for hauling the material.

3.5 COMPACTION

- A. Fill shall be spread in layers not exceeding 8 inches, watered as necessary, and compacted. Moisture content at time of compaction shall plus/minus 2 percent of optimum moisture. A

density of not less than 95 percent of maximum dry density shall be obtained within the building pads.

- B. Optimum moisture content and maximum dry density for each soil type used shall be determined in accordance with ASTM D 1557.
- C. Compaction of the fill shall be by mechanical means only. Where vibratory compaction equipment is used, it shall be the Contractor's responsibility to ensure that the vibrations do not damage nearby buildings or other adjacent property. Where vibratory compaction is not possible, pneumatic rolling equipment shall be used.

| MATERIAL | MINIMUM PERCENT COMPACTION |
|---|-------------------------------|
| Structural & granular fill in construction area | 95 |
| Subgrade below structural fill | 95 |
| Structural fill under exterior walls | 95 |
| Miscellaneous backfill | 90 |

3.6 MOISTURE CONTROL

- A. The material, while being compacted, shall be within the moisture range of 2 percent below to 2 percent above optimum, well distributed throughout the layer.

3.7 DENSITY REQUIREMENTS

- A. Density of undisturbed soils, in-place fill and backfill shall be determined in accordance with the procedures of ASTM D 1556 or ASTM D 6938. If tests indicate that the density of in-place soil is less than required, the material shall be scarified, moistened or dried as necessary to obtain proper moisture content and recompactd as necessary to achieve the proper densities. Sufficient density tests shall be made and reports submitted by the Testing Laboratory indicating all cut and fill areas were compacted and graded in accordance with the requirements.

3.8 SLOPE PROTECTION & DRAINAGE

- A. Berming and grading shall be done as may be necessary to prevent surface water from flowing into and out of the construction area. Any water accumulating therein shall be removed by pumping or by other methods.

3.9 SOIL EROSION PROTECTION

- A. The Contractor shall ensure that no soil erodes or blows from the site into public right-of-way or onto private property.
- B. The Contractor shall promptly clean up any material which erodes or blows into the public right-of-way or onto private property.

3.10 PRESERVATION OF PROPERTY

- A. Provide temporary fences, barricades, coverings, or other protections to preserve existing items indicated to remain and to prevent injury or damage to persons or property. Apply protections to adjacent properties as required.
- B. Restore damaged work to condition existing prior to start of work, unless otherwise directed.

3.11 EXISTING UTILITIES

- A. The Contractor shall verify the location of any utility lines, pipelines, or underground utility lines in or near the area of the work in advance of and during Earthwork. The Contractor is fully responsible for any and all damage caused by failure to locate, identify and preserve any and all existing utilities, pipelines and underground utility lines. Repair damaged utilities to the satisfaction of the utility owner at no expense to the Owner.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during grading, consult the Architect immediately for directions as to procedures.
- C. Cooperate with the Owner and public or private utility companies in keeping service and facilities in operation.

3.12 WASTE

- A. Dispose of all waste off Owner's property.
- B. Burning of waste will not be permitted.

3.13 AIR POLLUTION

- A. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt air pollution. Comply with governing regulations pertaining to environmental protection.

| SAMPLING AND TESTING SCHEDULE FOR EARTHWORK | | | |
|--|---|-----------------------------------|---|
| FIELD QUALITY CONTROL | | | |
| MATERIAL | TEST FOR | FREQUENCY | REMARKS |
| NATURAL GROUND | Compaction in accordance with ASTM D 1556 or ASTM D 6938 | 1 per 500 square yards of surface | Conduct a minimum of 2 tests on each section. |
| EMBANKMENT AND/OR SUBGRADE | Soil Conditions Moisture-Density in accordance with ASTM D 1557 | Test 1 per soil classification | |

| | | | |
|--|--|---|---|
| | Compaction control in accordance with ASTM D 1556 or ASTM D 6938 | 1 per each lift every 300 square yards of surface | Immediately after placing, Conduct a minimum of 2 tests per section |
| | | 1 per each lift for each 2500 square feet of fill | |

END OF SECTION 312311

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. Soil treatment.

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood preservative treatment by pressure process.
- 2. Section 076200 "Sheet Metal Flashing and Trim" for custom-fabricated, metal termite shields.

1.3 PREINSTALLATION MEETINGS:

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

1.4 ACTION SUBMITTALS:

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

- 1. Include construction details, material descriptions, dimensions of individual components, and profiles for termite control products.
- 2. Include the EPA-Registered Label for termiticide products.

1.5 INFORMATIONAL SUBMITTALS:

- A. Qualification Data: For qualified Installer.

- B. Product Certificates: For each type of termite control product.

- C. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:

- 1. Date and time of application.
- 2. Moisture content of soil before application.
- 3. Termiticide brand name and manufacturer.

4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes used, and rates of application.
6. Areas of application.
7. Water source for application.

D. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE:

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located and who employs workers trained and approved by manufacturer to install manufacturer's products.

1.7 FIELD CONDITIONS:

A. Soil Treatment:

1. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.
2. Related Work: Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

1.8 WARRANTY:

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied soil termiticide treatment will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
1. Warranty Period: Five years from date of Substantial Completion.
- B. Wood Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work consisting of applied wood termiticide treatment will prevent infestation of subterranean termites. If subterranean termite damage is discovered during warranty period, repair or replace damage caused by termite infestation and treat replacement wood.
1. Warranty Period: 12 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Source Limitations: Obtain termite control products from single source from single manufacturer.

2.2 SOIL TREATMENT:

- A. Termiticide: EPA-Registered termiticide acceptable to authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation, Pest Control Solutions; Termidor.
 - b. Bayer Environmental Science; Premise Pre-Construction or Premise Pro.
 - c. Ensysyex; Prothor SC2.
 - d. Syngenta; Demon Max.
 - 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. General: Prepare work areas according to the requirements of authorities having jurisdiction and according to manufacturer's written instructions before beginning application and installation of termite control treatment(s). Remove extraneous sources of wood cellulose and other edible materials, such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, according to requirements of authorities having jurisdiction.

3.3 APPLYING SOIL TREATMENT:

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Distribute treatment uniformly. Apply treatment at the product's EPA-Registered Label volume and rate for maximum specified concentration of termiticide to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction.
 - 1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
 - 2. Foundations: Soil adjacent to and along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing.
 - 3. Crawlspace: Soil under and adjacent to foundations. Treat adjacent areas, including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
 - 4. Masonry: Treat voids.
 - 5. Penetrations: At expansion joints, control joints, and areas where slabs and below-grade walls will be penetrated.
- B. Post warning signs in areas of application.
- C. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

3.4 PROTECTION:

- A. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- B. Protect termiticide solution dispersed in treated soils and fills from being diluted by exposure to water spillage or weather until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

END OF SECTION 313116

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including Supplemental General Conditions which apply to work of this section.

1.2 SUMMARY

- A. Extent of drilled piers is shown on drawings, including locations, diameters of shafts, bottom elevations, and details of construction.

1.3 SUBSURFACE SOIL DATA

- A. Subsurface soil investigations have been made and the results are available for examination by the Contractor. The Contractor is expected to examine the site and determine for himself the character of the materials to be encountered.

1.4 REFERENCES, latest editions of the following:

A. American Concrete Institute (ACI)

- | | | |
|----|-----------|--|
| 1. | ACI 301 | Specifications for Structural Concrete for Buildings |
| 2. | ACI 336.1 | Standard Specification for the Construction of Drilled Piers |

B. ASTM International (ASTM)

- | | | |
|----|------------------------|--|
| 1. | ASTM A 615/ A 615M | Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement |
| 2. | ASTM C 31/ C 31M | Standard Practice for Making and Curing Concrete Test Specimens in the Field |
| 3. | ASTM C 39/ C 39M | Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens |
| 4. | ASTM C 94/ C 94M | Standard Specification for Ready-Mixed Concrete |
| 5. | ASTM C 143/ C 143M | Standard Test Method for Slump of Hydraulic Cement Concrete |
| 6. | ASTM C 172-04 C172M | Standard Practice for Sampling Freshly Mixed Concrete |

| | | |
|-----|-----------------------|---|
| 7. | ASTM C 173/ C 173M | Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method |
| 8. | ASTM C 231/ C231M | Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method |
| 9. | ASTM C 260/ C260M | Standard Specification for Air-Entraining Admixtures for Concrete |
| 10. | ASTM C 494/ C 494M | Standard Specification for Chemical Admixtures for Concrete |

1.5 SUBMITTALS

- A. Reports: Submit the following reports directly to Engineer, with copy to others as designated.
 - 1. Concrete Materials Test Reports as proposed for use in concrete mixes.

1.6 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of American Concrete Institute (ACI) "Standard Specification for the Construction of Drilled Piers" (ACI 336.1), and as herein specified.
- B. Drilled Pier Installer Qualifications: Not less than three successfully completed contracts with similar soil conditions, shaft sizes, depths and volumes of work contained in this project. Submit satisfactory proof of compliance to Engineer.
- C. Materials and installed work may require testing and retesting at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, including retesting of rejected materials and installed work, will be Contractor's responsibility.
- D. Certificates of material properties and compliance with specified requirements may be submitted in lieu of testing, when acceptable to Engineer. Certificates of compliance must be signed by materials producer and Contractor.

1.7 JOB CONDITIONS

- A. Site Information: Data on indicated subsurface conditions are not intended as representations or warranties of continuity of such conditions. It is expressly understood that the Owner will not be responsible for interpretations or conclusions drawn by Contractor. Data is made available for convenience of Contractor and is not guaranteed to represent conditions that may be encountered.
- B. Additional test borings and other exploratory operations may be made by Contractor at no additional cost to Owner.

1.8 EXISTING UTILITIES

- A. Locate existing underground utilities by careful hand excavation before starting drilled pier excavation operations. If utilities are to remain in place, provide protection from damage during drilled pier operations.
- B. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult Engineer immediately for directions as to procedure. Cooperate with Owner and or utility companies in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility Owner.
- C. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Owner and after acceptable temporary utility services have been provided.

PART 2 - PRODUCTS

2.1 CONCRETE AND RELATED MATERIALS:

Concrete and related materials are specified in Division-3 sections.

- A. Maximum Aggregate Size: Not larger than three-fourths of minimum clear spacing between individual reinforcing bars or bundles of bars.
- B. Water: Clean, potable.
- C. Air-Entraining Admixture: ASTM C 260.
- D. Water-Reducing Admixture: ASTM C 494, Type A, containing no set-accelerating or set-retarding compounds, chlorides, fluorides or nitrates.
- E. Reinforcing Bars and Dowels: ASTM A 615, Grade 60.

2.2 CONCRETE MIX DESIGN

- A. General: Use independent testing facility for preparing and reporting proposed mix designs. Testing facility shall not be same as used for field quality control testing.
- B. Design mix in accordance with Section 4 of ACI 301 to produce concrete for drilled piers with minimum 28-day compressive strength of 4000 psi.
- C. Admixtures: Use air-entraining admixture in concrete, unless otherwise directed. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having 4 percent to 6 percent air content.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement of 6 inches plus or minus 1 ½ inches.

2.3 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
- B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
- C. When air temperature is between 85 deg.F (30 deg.C) and 90 deg.F (32 deg.C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg.F (32 deg.C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 DRILLED PIER EXCAVATION

- A. General: Excavate holes for drilled piers to elevation as shown on drawings. Drilled pier design dimensions shown are minimums.
- B. Construction Tolerances: Locate centerline of drilled piers within the following tolerances.
 - 1. Maximum permissible variation of location not more than 1/24th of shaft diameter or 3 inches, whichever is less.
 - 2. Shafts out of plumb:
 - a. For unreinforced piers extending through materials offering minimal or no lateral restraint (i.e. water, normally consolidated organic soils, and soils that might liquefy during an earthquake) - 12.5 percent of pier diameter.
 - b. For unreinforced piers extending through materials offering lateral restraint (soils other than those indicated in a.) - not more than 1.5 percent of pier length.
 - c. For reinforced concrete shafts - Out-of-plumb tolerance shall be 2.0 percent of the pier length.
 - 3. Concrete cut-off elevation, plus 1 inch to minus 3 inches.
 - 4. If above tolerances are exceeded, provide corrective construction to compensate for excessive eccentricity. Submit proposed corrective construction methods to Engineer for review before proceeding.
- C. Obstructions: If rock, boulders, or other unforeseen obstructions are encountered which cannot be removed by standard drilled pier excavation methods, and if such obstructions are not indicated by available subsurface data, removal of such obstructions will be paid for in accordance with terms of contract relative to changes in work.

D. Inspection

1. Each drilled pier must be inspected before placing concrete. The Contractor shall engage the services of a Registered Professional Geotechnical Engineer under whose supervision full-time inspection of the drilling and casting of the piers will be performed.
2. Provide facilities as required to assist inspection of excavations, and cooperate with inspecting personnel to expedite work.
3. Notify Engineer and testing facility at least 24 hours prior to time excavations will be drilled.

E. Overexcavation: No payment will be made for extra length, when drilled pier shafts are excavated to a greater depth than required, due to overdrilling by Contractor. Complete drilled pier and fill extra depth with concrete, if other conditions are satisfactory. Overexcavated shafts will be measured and paid for to original design or authorized depth.

3.2 REINFORCING STEEL AND DOWELS

- A. Fabricate and erect reinforcing cages in shafts as one continuous unit. Place reinforcement accurately and symmetrically about axis of hole and hold securely in position during concrete placement.
- B. Use templates to set anchor bolts, leveling plates and other accessories furnished under work of other sections. Provide blocking and holding devices to maintain required position during concrete placement.
- C. Protect exposed ends of extended reinforcing, dowels, or anchor bolts from mechanical damage and exposure to weather.

3.3 CONCRETE PLACEMENT

- A. General: Fill drilled piers with concrete immediately after inspection and approval by testing laboratory. Use protection sheets (cut out to receive concrete) over excavation openings, extending at least 12 inches beyond edge.
- B. Place concrete through a hopper centered in the reinforcing cage so that stream of concrete does not hit reinforcing or sides of hole. Let concrete free-fall for entire depth of shaft. Place concrete continuously and in a smooth flow without segregating. Provide mechanical vibration for consolidation of top 5 feet of each shaft.
- C. Place concrete in-the-dry unless placing underwater is acceptable to Engineer. If water occurs, and it is impracticable to dewater drilled pier excavation, and reasonable attempts to seal off water flow have failed, allow water level to attain its normal level and place concrete by tremie method. Control placement operations to ensure that tremie is not broken during continuous placing from bottom to top. Other methods of depositing concrete underwater, such as pump placement, may be used, subject to the approval of the Engineer.

- D. Stop concrete placement at cut-off elevation shown, screed level, and apply a scoured, rough finish. Where cut-off elevation is above ground elevation, form top section above grade and extend shaft to required elevation.

3.4 FIELD QUALITY CONTROL

- A. Quality Control Testing During Construction: Sample and test concrete for quality control during placement, as follows:
1. Sampling Fresh Concrete: ASTM C 172.
 2. Slump: ASTM C 143, one test for each concrete load at point of discharge; and one for each set of compressive strength test specimens.
 3. Air Content: ASTM C 173, or ASTM C 231, one for each set of compressive strength test specimens.
 4. Compression Test Specimens: ASTM C 31, one set of 4 standard cylinders for each compressive strength test, unless otherwise directed. Mold and store cylinders for laboratory cured test specimens except when field-cure test specimens are required.
 5. Compressive Strength Tests: ASTM C 39, one set of four cylinders for every 30 cubic yards of concrete placed. One specimen tested at 7 days, 2 specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 6. Report test results in writing to Engineer and Contractor on same day tests are made. Include in reports project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type, location of drilled pier, design compressive strength at 28 days, concrete mix proportions and materials; compressive breaking strength and type of break for both 7-day test and 28-day tests.
- B. Additional Concrete Tests: Testing service may take core samples of in-place concrete when test results are such that there is reasonable doubt specified concrete strengths have not been attained.

3.5 INSPECTION AND TESTS FOR DRILLED PIERS

- A. Soil testing facility shall perform and report specified tests, and additional tests which may be required. Conduct tests and provide reports as soon as possible to not delay concreting operations for acceptable excavations.

END OF SECTION 316329