

Project Manual

for

Department of Human Services – Rockdale County Conyers, Georgia

Owner:

Rockdale County

Architect:

Praxis3 LLC

100 Peachtree St. NW

Suite 1450

Atlanta, GA 30303

(404) 875-4500

Project No. 23122



GEORGIA DEPARTMENT *of* HUMAN SERVICES
DIVISION *of* FAMILY & CHILDREN SERVICES

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SECTION 01 1000

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Purchase contracts.
4. Owner-furnished, Contractor-installed (OFCI) products.
5. Contractor's use of site and premises.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and Drawing conventions.
9. Miscellaneous provisions.

- B. Related Requirements:

1. Section 01 5000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Department of Human Services of Rockdale County.

1. Project Location: 975 SW Taylor Street, Conyers, GA 30012

- B. Owner: Rockdale County

1. Owner's Representative: Michael Robinson, Senior Capital Projects Manager, 770.278.7292

- C. Architect: Praxis3, 100 Peachtree St. NW, Suite 1450, Atlanta, GA 30303
- D. Web-Based Project Software: Project software will be used for purposes of managing communication and documents during the construction stage.
 - 1. See Section 01 3100 "Project Management and Coordination." for requirements for using web-based Project software.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Renovations to the area of work include demolition of select interior partitions, ceilings, lighting, plumbing fixtures, plumbing locations, and doors. New construction includes build out of new interior partitions, ceilings, lighting, new millwork, plumbing locations, reuse of plumbing fixtures, and update of interior finishes and other work indicated in the contract documents.
- B. Type of Contract:
 - 1. Project will be constructed under a single prime contract.

1.5 OWNER-FURNISHED, CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner shall furnish products indicated. The Work includes unloading, handling, storing, installing and protecting Owner-furnished products and making building services connections.
- B. Owner-Furnished, Contractor-Installed Products: Existing and new furniture

1.6 CONTRACTOR'S USE OF SITE AND PREMISES

- A. General: Contractor shall have use of Project site for construction operations as indicated on Drawings and by the Contract limits and as indicated by requirements of this Section.
- 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, parking garage, loading areas 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 for storage of materials unless indicated otherwise.
 - 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.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

- D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

- B. 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. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
2. 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.
3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.8 WORK RESTRICTIONS

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

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

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

1. Notify Owner not less than two days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than two days in advance of proposed disruptive operations.

2. Obtain Owner's written permission before proceeding with disruptive operations.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations are scheduled on Drawings.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000

SECTION 01 2500
SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication, or installation method cannot be provided, if applicable.
 - b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where requested.

- f. Certificates and qualification data, where applicable or requested.
 - g. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
 - h. Cost information, including a proposal of change, if any, in the Contract Sum.
 - i. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - j. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 14 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.

1.4 QUALITY ASSURANCE

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

1.5 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.6 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution is compatible with other portions of the Work.
 - e. Requested substitution provides specified warranty.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 15 days after the Notice of Award. Requests received after that time will not be considered.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution provides specified warranty.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500

JOB NAME	Department of Human Services
JOB NUMBER	23122
ARCHITECT	Praxis3
CONTRACTOR	
OWNER	Rockdale County
SUBCONTRACTOR/VENDOR	
SPECIFICATION SECTION	
ITEM	
SUBMITTAL NUMBER	
SUBMITTAL DATE	

ARCHITECT STAMP	
<input type="checkbox"/> Reviewed <input type="checkbox"/> Exceptions Noted <input type="checkbox"/> Rejected <input type="checkbox"/> Revised and Resubmit	
<p>This review is only for general conformance with the design concept of the project and general conformance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve contractor from compliance with the requirements of the plans and specifications. Approval of a specific item shall not include approval of an assembly of which the item is a component. Contractor is responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to the means, methods, techniques, sequences and procedures of construction; coordination of Work of all trades; and for performing all work in a safe and satisfactory manner.</p>	
PRAXIS3	Date: _____ By: _____

CONTRACTOR STAMP
CONSULTANT STAMP

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. RFIs.
 - 3. Digital project management procedures.
 - 4. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 01 3200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 7700 "Closeout Procedures" for coordinating closeout of the Contract.

1.2 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.3 INFORMATIONAL SUBMITTALS

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

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in each built facility. Keep list current at all times.

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. 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 own 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 performance and accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. 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.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's construction schedule.

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

1.5 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 1. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above.
 1. Attachments shall be electronic files in PDF format.

- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt by Architect of additional information.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of web-based Project software. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

1.6 DIGITAL PROJECT MANAGEMENT PROCEDURES

- A. Use of Architect's Digital Data Files: Digital data files of Architect's drawings in 2D, dwg. format will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
 2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
 3. Contractor shall execute a data licensing agreement in the form of Agreement form provided by the Architect and acceptable to Owner and Architect.

- a. Subcontractors, and other parties granted access by Contractor to Architect's digital data files shall execute a data licensing agreement in the form of Agreement form provided by the Architect and acceptable to Owner and Architect.
- B. Web-Based Project Software: Use Architect's web-based Project software site, ROUNDHOUSEPM for purposes of hosting and managing Project communication and documentation until Final Completion.
1. Web-based Project software site includes, at a minimum, the following features:
 - a. Compilation of Project data, including Contractor, subcontractors, Architect, architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
 - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
 - c. Document workflow planning, allowing customization of workflow between project entities.
 - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
 - e. Track status of each Project communication in real time, and log time and date when responses are provided.
 - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
 - g. Processing and tracking of payment applications.
 - h. Processing and tracking of contract modifications.
 - i. Creating and distributing meeting minutes.
 - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
 - k. Management of construction progress photographs.
 - l. Mobile device compatibility, including smartphones and tablets.
 2. At completion of Project, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.
- C. PDF Document Preparation: Where PDFs are required to be submitted to Architect, prepare as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

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 a minimum of 10 working days prior to meeting.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will 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 and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority (if any), Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Sustainable design requirements.
 - o. Preparation of Record Documents.
 - p. Use of the premises and existing buildings (if any).
 - q. Work restrictions.
 - r. Working hours.
 - s. Owner's occupancy requirements.
 - t. Responsibility for temporary facilities and controls.
 - u. Procedures for moisture and mold control.
 - v. Procedures for disruptions and shutdowns.
 - w. Construction waste management and recycling.
 - x. Parking availability.
 - y. Office, work, and storage areas.

- z. Equipment deliveries and priorities.
 - aa. First aid.
 - bb. Security.
 - cc. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity when required by other sections and when required for coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Owner's Commissioning Authority (if any) of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - 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 other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority (if any), Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
 - c. Procedures for completing and archiving web-based Project software site data files.
 - d. Submittal of written warranties.
 - e. Requirements for preparing operations and maintenance data.
 - f. Requirements for delivery of material samples, attic stock, and spare parts.
 - g. Requirements for demonstration and training.
 - h. Preparation of Contractor's punch list.
 - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
 - j. Submittal procedures.
 - k. Coordination of separate contracts.
 - l. Owner's partial occupancy requirements.
 - m. Installation of Owner's furniture, fixtures, and equipment.
 - n. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings biweekly or as otherwise agreed upon intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner, Owner's Commissioning Authority (if any) and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

- a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Resolution of BIM component conflicts.
 - 4) Status of submittals.
 - 5) Deliveries.
 - 6) Off-site fabrication.
 - 7) Access.
 - 8) Site use.
 - 9) Temporary facilities and controls.
 - 10) Progress cleaning.
 - 11) Quality and work standards.
 - 12) Status of correction of deficient items.
 - 13) Field observations.
 - 14) Status of RFIs.
 - 15) Status of Proposal Requests.
 - 16) Pending changes.
 - 17) Status of Change Orders.
 - 18) Pending claims and disputes.
 - 19) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100

SECTION 01 3233
PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Periodic construction photographs.
 - 2. Final completion construction photographs.
- B. Related Requirements:
 - 1. Section 01 3100 "Project Management and Coordination" for Project meetings and Project schedule.
 - 2. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS

- A. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based project software site.
 - 2. Identification: Provide the following information with each image description in web-based project software site.
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of location, vantage point, and direction.

1.3 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. Metadata: Record accurate date and time from camera.
- D. File Names: Name media files with date and sequential numbering suffix.

1.4 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
- B. Periodic Construction Photographs: Take 20 photographs coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- C. In addition to periodic, recurring views, take photographs of each of the following events:
 - 1. Completion of site clearing.
 - 2. Excavation in progress.
 - 3. Foundations in progress and upon completion.
 - 4. Structural framing in progress and upon completion.
 - 5. Enclosure of building, upon completion.
- D. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3233

SECTION 01 3300
SUBMITTAL PROCEDURES

1.1 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.
3. Electronic Document Submittal Service.

B. Related Requirements:

1. Section 01 3301 "Submittal Cover Sheet" for Submittal Cover Sheet form to be used with all submittals.

1.2 DEFINITIONS

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

1.3 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format and transmitted via ROUNDHOUSEPM, an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
1. Besides submittals for review, information, and closeout, this procedure applies to requests for information (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
 2. Contractor and Architect are required to use this service.
 3. It is the Contractor's responsibility to submit documents in PDF format.
 4. Subcontractors, suppliers, and Architect's consultants are to be permitted to use the service at no extra charge. If the Contractor desires to use other software (e.g. ProCore, etc.), the Contractor shall negotiate a fee to be paid to the Architect for time performed to duplicate administrative activities.
 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com), unless such software capability is provided by the service provider.
 6. Paper document transmittals will not be reviewed; emailed PDF documents will not be reviewed.

7. All other specified submittal and document transmission procedures apply, except that electronic document requirements to not apply to samples or color selection charts, oversized submittals (too large to be scanned and transmitted via ROUNDHOUSEPM) and samples.

B. The Contractor shall furnish to the Architect a list of names and email addresses for any party that should have access to the project website. This includes people within their company plus any Subcontractors working on the project requiring access to project information. The cost for ROUNDHOUSEPM is not a cost to the Contractor so the Contractor is encouraged to provide all names and email addresses.

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Within 5 days of Contract commencement, submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal and include on submittal cover sheet in format indicated on the attached submittal cover sheet sample.:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Contractor.
5. Name of firm or entity that prepared submittal.
6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Clearly identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

1.6 SUBMITTAL PROCEDURES

- A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. ROUNDHOUSEPM: Prepare submittals in PDF form, and upload to ROUNDHOUSEPM software website. Enter required data in web-based software site to fully identify submittal.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 14 calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Resubmittal Review: Allow 14 calendar days for review of each resubmittal.
- D. Resubmittals: Make resubmittals in same form as initial submittal.
- E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- F. Use for Construction: Retain complete copies of submittals on Project construction site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

1.7 SUBMITTAL REQUIREMENTS

- A. Submittal Cover Sheet: Each submittal shall utilize the Submittal Cover Sheet form provided in Section 01 3301 "Submittal Cover Sheet". Submittals without a cover sheet will be returned without review.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - 1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
 - 2. Mark each submittal to show which products and options are applicable.
 - 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.

- b. Manufacturer's product specifications.
 - c. Standard color charts (physical color charts and color samples are required, copies of color charts are not acceptable).
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data unless submittal based on Architect's digital data drawing files is otherwise permitted.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
- D. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Product name and name of manufacturer.
 - c. Number and title of applicable Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit two sets of Samples, unless other quantity is specified in individual sections. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
- F. Qualification Data: As required in individual specification sections, prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- G. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- H. Certificates: Submit as required by individual sections
 1. Certificates and Certifications Submittals: Submit 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. Provide a notarized signature where indicated.

2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Test and Research Reports: as required by individual sections:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. Delegated Design certification shall be made by a licensed professional in good standing in the State or jurisdiction having authority where the specific project is located.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with indication in web-based Project software. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 - 1. Architect will not review submittals received from Contractor that do not have Contractor's review and approval stamp. Such submittals will be returned without review.
 - 2. Submittals without cover sheet (see section 01 3301 "Submittal Cover Sheet") will be returned without review.

1.10 ARCHITECT'S REVIEW

- A. Action Submittals: Architect will review each submittal, indicate corrections or revisions required, and return it.
 - 1. ROUNDHOUSEPM: Architect will indicate, on ROUNDHOUSEPM, the appropriate action.
- B. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Architect will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3300

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and quality-control services required by Architect, Owner or authorities having jurisdiction are not limited by provisions of this Section.

1.2 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.

2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
- E. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- I. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect.

1.3 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents including the Specifications, provide products and systems complying with specific performance and design criteria indicated. Delegated Design certification shall be made by a licensed professional in good standing in the State or jurisdiction having authority where the specific project is located.

1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 ACTION SUBMITTALS

- A. Delegated-Design Services 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.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

1.7 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
 2. Project title and number.
 3. Name, address, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Statement on condition of substrates and their acceptability for installation of product.
 2. Statement that products at Project site comply with requirements.
 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
5. Other required items indicated in individual Specification Sections.

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

1. Statement that equipment complies with requirements.
2. Results of operational and other tests and a statement of whether observed performance complies with requirements.
3. Other required items indicated in individual Specification Sections.

1.8 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. 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.

- 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 of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Architect.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Architect's approval of mockups before starting corresponding work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup for projects within 2 hours driving distance of Atlanta, Georgia, 14 days if more than 2 hours driving distance.
 7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 8. Demolish and remove mockups when directed unless otherwise indicated.

1.9 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection 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
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
 1. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection 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 inspection 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. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- 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 as specified in Section 01 3300 "Submittal Procedures."
- E. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- F. 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 inspection.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

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

- 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

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

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

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

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

END OF SECTION 01 4000

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 USE CHARGES

- A. General: Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.

1.3 INFORMATIONAL SUBMITTALS

- A. Prior to commence of the work submit the following for approval:
 1. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.
 2. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
 3. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
 4. Moisture-and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold.
 5. 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.
 6. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 5. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
 - 6. Internet Access: Wireless.
 - 7. Printer.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7700 "Closeout Procedures."
- 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 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Maintain negative air pressure within work area, using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 2. Maintain dust partitions during the Work. Isolate limited work within occupied areas using portable dust-containment devices.
 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Temporary 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.

1. Provide temporary dehumidification systems when required to reduce ambient and substrate moisture levels to level required to allow installation or application of finishes and their proper curing or drying.
 - F. 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 underground unless otherwise indicated.
 - G. 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.
 - H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install WiFi cell phone access equipment and one land-based telephone line(s) for each field office.
- 3.4 SUPPORT FACILITIES INSTALLATION
- A. General: Comply with the following:
 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
 - B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
 - C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
 - D. Parking: Provide temporary parking areas for construction personnel.
 - E. Project Signs: Unauthorized signs are not permitted.
 1. Provide project identification sign if indicated on Drawings.
 2. Erect on site at location established by Architect.
 3. No other signs are allowed without Owner permission except those required by law.
 - F. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."

- G. 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.
- H. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- I. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.5 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.
 - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- 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. Provide Erosion and Sedimentation Control measures as indicated in the Contract Documents.
- C. Tree Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- D. 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 workday.
- E. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- F. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- G. 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.
 - a. Provide temporary partitions and ceilings as indicated to separate work areas from Owner-occupied areas, to prevent penetration of dust and moisture into Owner-occupied areas, and to prevent damage to existing materials and equipment.

- H. 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. Comply with additional limits on smoking specified in other Sections.
 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.

3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.
1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 2. 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.
 3. Indicate methods to be used to avoid trapping water in finished work.
- B. Exposed Construction Period: 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 Period: 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 and replace stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

- D. Controlled Construction Period: 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 temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for information regarding Owner-Furnished products.
 - 2. Section 01 2100 "Allowances" for products selected under an allowance.
 - 3. Section 01 2300 "Alternates" for products selected under an alternate.
 - 4. Section 01 2500 "Substitution Procedures" for requests for substitutions.
 - 5. Section 01 3001 "Responsibility Chart" for information regarding responsible parties for Furnishing and Installing products.
 - 6. Section 01 7700 "Closeout Procedures" for submitting warranties.

1.2 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Substitution: Refer to Section 012500 "Substitution Procedures" for definition and limitations on substitutions.

1.3 ACTION SUBMITTALS

- A. As indicated in Section 01 3300 "Submittal Requirements".

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

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

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties meeting requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. DO NOT USE products having any of the following characteristics:
 - a. Made using or containing CFC's or HCFC's.
 - b. Made of wood from newly cut old growth timber.
 - 7. Where all other criteria are met, contractor shall give preference to products that:
 - a. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - b. Have longer documented life span under normal use.
 - c. Results in less construction waste.
 - d. Are made of vegetable materials that are rapidly renewable.
 - e. Have a published GreenScreen Chemical Hazard Analysis.
 - 8. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
 - 1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: ..."

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: ..."
 3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: ..."
 4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.
 - a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: ..."
 5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: ..."
 6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.
 - a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: ..."
 7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
 - a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 2500 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- E. Sustainable Product Selection: Where Specifications require product to meet sustainable product characteristics, select products complying with indicated requirements. Comply with requirements in Division 01 sustainability requirements Section and individual Specification Sections.
 1. Select products for which sustainable design documentation submittals are available from manufacturer.

2.2 COMPARABLE PRODUCTS

- A. Comparable Products must meet the requirements of 01 2500 "Substitution Procedures".

2.3 OWNER-FURNISHED, CONTRACTOR-INSTALLED (OFCI) PRODUCTS

- A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.

- B. Contractor's Responsibilities:

1. Review Owner reviewed shop drawings, product data, and samples.
2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
3. Handle, store, install and finish products.
4. Repair or replace items damaged after receipt.

2.4 OWNER-FURNISHED, OWNER-INSTALLED (OFOI) PRODUCTS

- A. Owner's Responsibilities:

1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
2. Arrange and pay for product delivery to site.
3. On delivery, inspect products jointly with Contractor.
4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
5. Arrange for manufacturers' warranties, inspections, and service.
6. Receive and unload products at site; inspect for completeness or damage jointly with Owner.

7. Handle, store, install and finish products.
8. Repair or replace items damaged after receipt.

B. Contractor's Responsibilities:

1. Make space available and coordinate appropriate time in schedule for Owner or Owner's forces to install.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

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

- B. Related Requirements:
 - 1. Section 01 1000 "Summary" for coordination of Owner-furnished products, Owner-performed work, and limits on use of Project site.
 - 2. Section 01 3300 "Submittal Procedures" for submitting surveys.
 - 3. Section 01 7700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
 - 4. Section 02 4119 "Selective Demolition" for demolition and removal of selected portions of the building.
 - 5. Section 07 8413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 INFORMATIONAL SUBMITTALS

- A. Final Property Survey: Submit two copies showing the Work performed and record survey data.

1.4 QUALITY ASSURANCE

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

- B. Professional Engineer Qualifications: Refer to Section 014000 "Quality Requirements."
- C. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
 - 2. Operational Elements: Do not cut and patch 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.
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. 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.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish limits on use of Project site.
 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 4. Inform installers of lines and levels to which they must comply.
 5. Check the location, level and plumb, of every major element as the Work progresses.
 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

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

- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

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

3.6 OWNER-FURNISHED, OWNER-INSTALLED (OFOI) PRODUCTS

- A. Per 01 6000 PRODUCT REQUIREMENTS, Make space available and coordinate appropriate time in schedule for Owner or Owner's forces to install.

3.7 CUTTING AND PATCHING

- B. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- C. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- D. Temporary Support: Provide temporary support of work to be cut.
- E. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- F. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 1000 "Summary."

- G. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize or prevent interruption to occupied areas.
- H. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
 - 7. Use of explosives is not permitted.
- I. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - 3. Floors and Walls: 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 in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- J. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 - B. Site: Maintain Project site free of waste materials and debris.
 - C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
 - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
 - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
 - F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
 - G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."
 - 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 ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.8 STARTING AND ADJUSTING
- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
 - B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 7300

SECTION 01 7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 02 4116 "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
 - 2. Section 02 4119 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
 - 3. Section 04 2000 "Unit Masonry" for disposal requirements for masonry waste.
 - 4. Section 31 1000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.
- C. Construction Waste Management Goal: Divert at least 75% of construction waste to uses other than landfill disposal.

1.2 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.3 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 14 days of date established for the Notice of Award.

1.4 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Total quantity of waste in tons.
 - 3. Quantity of waste salvaged, both estimated and actual in tons.
 - 4. Quantity of waste recycled, both estimated and actual in tons.
 - 5. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Refrigerant Recovery: Comply with requirements in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition" for refrigerant recovery submittals.

1.5 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Comply with requirements in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements of this Section.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

- B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 - 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 - 2. Comply with Section 01 5000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Comply with requirements in Section 02 4116 "Structure Demolition", Section 02 4119 "Selective Demolition" for salvaging demolition waste.
- B. Salvaged Items for Reuse in the Work:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- C. Salvaged Items for Sale and Donation: Not permitted on Project site.
- D. Salvaged Items for Owner's Use:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from the weather.

5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor as often as required to prevent overfilling bins.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 1. Pulverize concrete to maximum 4-inch size.
- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 1. Pulverize masonry to maximum 4-inch size.
 2. Clean and stack undamaged, whole masonry units on wood pallets.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- E. Metals: Separate metals by type if required by recycling vendor.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- F. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- I. Metal Suspension System: Separate metal members, including trim and other metals from acoustical panels and tile, and sort with other metals.
- J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 1. Store clean, dry carpet and pad in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
- K. Carpet Tile: Remove debris, trash, and adhesive.
 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by carpet reclamation agency or carpet recycler.
- L. Piping: Reduce piping to straight lengths and store by material and size. Separate supports, hangers, valves, sprinklers, and other components by material and size.
- M. Conduit: Reduce conduit to straight lengths and store by material and size.

- N. Lamps: Separate lamps by type and store according to requirements in 40 CFR 273.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

D. Paint: Seal containers and store by type.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

END OF SECTION 01 7419

SECTION 01 7700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01 7823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 2. Section 01 7839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
 - 3. Section 01 7900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.2 ACTION SUBMITTALS

- A. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- B. Certified List of Incomplete Items: Final submittal at final completion.

1.3 CLOSEOUT SUBMITTALS

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

1.4 SUBSTANTIAL COMPLETION PROCEDURES

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

- B. Submittals Prior to Substantial Completion: Complete the following a minimum of seven days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number.
 5. Submit testing, adjusting, and balancing records.
 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of seven days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of seven days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 2900 requirements of the Contract.
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Submit list of incomplete items in the following format:
 - a. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).

1.7 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- C. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
1. Submit by uploading to web-based project software site.
- 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: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. 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.
 - c. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - d. Sweep concrete floors broom clean in unoccupied spaces.
 - e. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - f. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - g. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - h. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - i. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 5000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 7419 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations, before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

END OF SECTION 01 7700

SECTION 01 7823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
1. Operation and maintenance documentation directory manuals.
 2. Emergency manuals.
 3. Systems and equipment operation manuals.
 4. Systems and equipment maintenance manuals.
 5. Product maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved 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 operation and maintenance submittals is acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:
1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.
- C. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 14 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 14 days of receipt of Architect's comments and prior to commencing demonstration and training.
- D. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.3 FORMAT OF OPERATION AND MAINTENANCE MANUALS

- A. 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: Bookmark 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.

1.4 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Architect.
 7. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 8. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. 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."

1.5 EMERGENCY MANUALS

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

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

- C. 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.

- D. 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.

- E. 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.
 - 6. Emergency Procedures on video when available.

1.6 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

- B. 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.

C. 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.

D. 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.

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

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

1.7 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

B. 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 warranties and bonds, as described below.

C. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; 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.

- a. 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.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. 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.
- H. 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.
- 1.8 PRODUCT MAINTENANCE MANUALS
- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
 - B. 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.
 - 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 7823

SECTION 01 7839
PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data and Shop Drawings: Submit annotated PDF electronic files and directories of each submittal.

1.3 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 acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.

- e. Cross-reference record prints to corresponding photographic documentation.
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.
 - 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 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 and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Refer instances of uncertainty to Architect for resolution.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets. Scan in color for Owner PDF files.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."

- d. Name of Architect.
- e. Name of Contractor.

1.4 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.
- B. Format: Submit record Specifications as annotated PDF electronic file.

1.5 RECORD PRODUCT DATA AND SHOP DRAWINGS

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data and Shop Drawings to indicate the actual product installation where installation varies substantially from that indicated in Product Data and/or Shop Drawings 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.
- C. Format: Submit record Product Data and Shop Drawings as annotated PDF electronic file.
 - 1. Include record Product Data and Shop Drawings directory organized by Specification Section number and title, electronically linked to each item of record Product Data and Shop Drawings.

1.6 MAINTENANCE OF RECORD DOCUMENTS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 7839

SECTION 01 7900
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 01 7823 "Operation and Maintenance Data."

1.4 QUALITY ASSURANCE

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

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate 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 have been reviewed and approved by Architect.

1.6 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. 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.

1.7 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.8 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.9 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.
 - 1. Submit video recordings on CD-ROM or thumb drive or by uploading to web-based Project software site.

- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
- E. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 01 7900

SECTION 02 4119
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Section 01 7419 "Construction Waste management and Disposal" for disposition of waste generated by demolition activities.

1.2 DEFINITIONS

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

1.3 MATERIALS OWNERSHIP

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

1.4 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of selective demolition activities with starting and ending dates for each activity.
- C. Pre-demolition photographs or video. Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Submit before Work begins.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.6 CLOSEOUT SUBMITTALS

- A. Inventory of items that have been removed and salvaged.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

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

- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.
- G. Arrange selective demolition schedule so as not to interfere with Owner's operations.

1.9 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.
- C. Comply with disposal requirements set forth in the approved waste management plan as required by Section 01 7419 "Construction Waste management and Disposal".

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- A. Review demolition plan and sequence with Structural Engineer and Architect prior to demolition activities or removing any element which might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
- B. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

- 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. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power

- tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 4. Maintain fire watch during and for at least 4 hours after flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 7419 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. 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 02 4119

SECTION 06 1000
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- B. Evaluation Reports: For the following, from ICC-ES:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Engineered wood products.

1.4 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade

lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. 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 and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood floor plates that are installed over concrete slabs-on-grade.

E. Separate Wood-Preservative-Treated wood materials from cold form metal framing with an ice and water shield product to prevent corrosion.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply 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.

- 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, and 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 beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all rough carpentry unless otherwise indicated.
- F. Separate Fire-Retardant-Treated wood materials from cold form metal framing with an ice and water shield product to prevent corrosion.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
 - 1. Application: Interior partitions not indicated as load bearing.
 - 2. Species:
 - a. Southern pine or mixed southern pine; SPIB.
 - b. Northern species; NLGA.
 - c. Eastern softwoods; NeLMA.
 - d. Western woods; WCLIB or WWPA.
- B. Framing Other Than Non-Load-Bearing Partitions: No. 2 grade.
 - 1. Application: Framing other than interior partitions not indicated as load bearing.
 - 2. Species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Spruce-pine-fir; NLGA.
 - e. Douglas fir-south; WWPA.
 - f. Hem-fir; WCLIB or WWPA.
 - g. Douglas fir-larch (north); NLGA.
 - h. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- C. Exposed Framing: Hand-select material for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - 1. Species and Grade: As indicated above for load-bearing construction of same type.

2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Boise Cascade Corporation.
 - b. Finnforest USA.
 - c. Georgia-Pacific Gypsum LLC.
 - d. Jager Building Systems Inc.
 - e. Louisiana-Pacific Corporation.
 - f. Pacific Woodtech Corporation.
 - g. Roseburg Forest Products.
 - h. Standard Structures Inc.
 - i. Stark Truss Company, Inc.
 - j. West Fraser Timber Co., Ltd.
 - k. Weyerhaeuser Company.
 2. Extreme Fiber Stress in Bending, Edgewise: As indicated on drawings
 3. Modulus of Elasticity, Edgewise: As indicated on drawings
- B. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Comply with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Anthony-Domtar Inc.
 - b. Boise Cascade Corporation.
 - c. Georgia-Pacific Gypsum LLC.
 - d. International Beams Inc.
 - e. International Paper Corporation.
 - f. J. M. Huber Corporation.
 - g. Jager Building Systems Inc.
 - h. Louisiana-Pacific Corporation.
 - i. Nascor Incorporated.
 - j. Pacific Woodtech Corporation.
 - k. Roseburg Forest Products.
 - l. Standard Structures Inc.
 - m. Stark Truss Company, Inc.
 - n. Superior Wood Systems.
 - o. Weyerhaeuser Company.
 2. Web Material: Plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1
 3. Structural Properties: Depths and design values not less than those indicated.
 4. Comply with APA PRI-400. Factory mark I-joists with APA-EWS trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA-EWS standard.
- C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research or evaluation report for I-joists.
1. Manufacturer: Provide products by same manufacturer as I-joists.
 2. Material: product made from any combination solid lumber, wood strands, and veneers.

3. Thickness: As indicated on drawings
4. Comply with APA PRR-401, rim board grade. Factory mark rim boards with APA-EWS trademark indicating thickness, grade, and compliance with APA-EWS standard.

2.6 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Nailers.
 3. Rooftop equipment bases and support curbs.
 4. Furring.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content and any of the following species and grades:
 1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
 2. Eastern softwoods; No. 2 Common grade; NeLMA.
 3. Northern species; No. 2 Common grade; NLGA.
 4. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.

2.7 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exposure 1, C-D Plugged in thickness indicated or, if not indicated, not less than nominal thickness. Fire retardant treated if indicated on drawings.

2.8 FASTENERS

- A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.
 1. Where rough carpentry is exposed to weather, in ground contact, fire retardant treated, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.

2.9 METAL FRAMING ANCHORS

- A. Products: Subject to compliance with requirements, provide products by one of the following manufacturers:
 1. Cleveland Steel Specialty
 2. KC Metals Products Inc
 3. Phoenix Metal Products
 4. Simpson Strong-Tie Co.
 5. USP Structural Connectors
- B. Allowable design loads, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
 - 1. Use for interior locations unless otherwise indicated.
- D. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than thick.
 - 1. Use for wood-preservative-treated lumber and where indicated.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, ¼-inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- E. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- H. Comply with AWPAs M4 for applying field treatment to cut surfaces of preservative-treated lumber.

- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
 - 2. ICC-ES evaluation report for fastener.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILERS

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

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

END OF SECTION 06 1000

SECTION 06 1053

MISCELLANEOUS ROUGH CARPENTRY

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. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking and nailers.
4. Wood furring.
5. Wood sleepers.
6. Plywood backing panels.

B. Related Requirements:

1. Section 06 1600 "Sheathing" for sheathing, subflooring, and underlayment.
2. Section 31 3116 "Termite Control" for site application of borate treatment to wood framing.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply 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 materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
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.

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated.
 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 and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.
6. Separate Wood-Preservative-Treated wood materials from cold form metal framing with an ice and water shield product to prevent corrosion.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply 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.
- 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, and 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 beyond the centerline of the burners at any time during the test.
 1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high-temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all miscellaneous carpentry unless otherwise indicated.
- G. Separate Fire-Retardant-Treated wood materials from cold form metal framing with an ice and water shield product to prevent corrosion.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.
- C. Concealed Boards: 19 percent maximum moisture content of the following species and grades:
 - 1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

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

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

- K. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

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

END OF SECTION 06 1053

SECTION 06 2023

INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior trim.
2. Interior plywood paneling.

B. Related Requirements:

1. Section 06 4023 "Interior Architectural Woodwork" for shop fabricating interior wood items.
2. Section 06 4116 "Plastic-Laminate-Clad Architectural Cabinets".

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
- B. Samples: For each type of wood material.
1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half 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 foam-plastic moldings, with half of exposed surface finished; 50 sq. in. (300 sq. cm).
 3. 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.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard

Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber, mark grade stamp on end or back of each piece.

B. Softwood Plywood: DOC PS 1.

C. Hardboard: ANSI A135.4.

D. MDF: ANSI A208.2, Grade 130.

2.2 INTERIOR TRIM

A. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade:
 - a. Eastern white, C Select; NeLMA, NLGA, or WWPA
 - b. White woods; WWPA C Select.
 - c. Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Superior or C & Better finish.
 - d. Southern pine; SPIB B & B finish.
 - e. Western red cedar; NLGA, WCLIB, or WWPA Clear Heart.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).

B. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: As indicated on the drawings.
2. Maximum Moisture Content: 13 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not 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:
 - a. Eastern white pine
 - b. Douglas fir-larch or Douglas fir south; NLGA, WCLIB, or WWPA Superior or C & Better finish.
2. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
3. Finger Jointing: Allowed.
4. Face Surface: Surfaced (smooth).
5. Optional Material: Primed MDF of same actual dimensions as lumber indicated may NOT BE USED in lieu of lumber.

D. Softwood Moldings for Transparent Finish (Stain or Clear Finish): MMPA WM 4, N-grade wood moldings. Made to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."

1. Species: As indicated on drawings
 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.
 5. Molding Patterns: As indicated on the drawings.
- E. Hardwood Moldings for Transparent Finish (Stain or Clear Finish): MMPA WM 4, N-grade wood moldings made to patterns included in MMPA's "HWM/Series Hardwood Moulding Patterns."
1. Species: as indicated on drawings.
 2. Maximum Moisture Content: 9 percent.
 3. Finger Jointing: Not allowed.
 4. Matching: Selected for compatible grain and color.
 5. Molding Pattern: As indicated on drawings.
- F. Moldings for Opaque Finish (Painted Finish): Made to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."
1. Softwood Moldings: MMPA WM 4, P grade.
 - a. Species: White Pine
 - b. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 2. Hardwood Moldings: MMPA WM 4, P-grade.
 - a. Species: As indicated on drawings
 - b. Maximum Moisture Content: 9 percent.
 3. Finger Jointing: Allowed.

2.3 PANELING

- A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.
1. Face Veneer Species and Cut: Species as indicated; Plain saw
 2. Veneer Matching: Book Matched
 3. Backing Veneer Species: Any hardwood compatible with face species.
 4. Construction: Veneer core.
 5. Thickness: As indicated
- B. Hardboard Paneling: Interior factory-finished hardboard paneling complying with ANSI A135.5.
1. Thickness: As indicated.
 2. Finish: Class II.
 3. Surface-Burning Characteristics: As follows, tested according to ASTM E 84:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.

4. Colors, Textures, and Patterns: Match Architect's samples
- C. Board Paneling: Interior wood-board paneling complying with MMPA WM 9.
1. Species: As indicated
 2. Grade: Clear No. 1
 3. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 4. Pattern: As indicated.

2.4 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.
- B. Low-Emitting Materials: Adhesives shall comply with testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
- D. Paneling Adhesive: Comply with paneling manufacturer's written instructions for adhesives.

PART 3 - EXECUTION

3.1 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.

3.2 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.
 1. Use concealed shims where necessary for alignment.
 2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.

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.

3.3 STANDING AND RUNNING TRIM INSTALLATION

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 1. Do not use pieces less than 24 inches long, except where necessary.
 2. Stagger joints in adjacent and related standing and running trim.
 3. 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.
 4. Use scarf joints for end-to-end joints.
 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 7. Install trim after gypsum-board joint finishing operations are completed.
 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 9. Fasten to prevent movement or warping.
 10. Countersink fastener heads on exposed carpentry work and fill holes.

3.4 PANELING INSTALLATION

- A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels.
 1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Install with uniform tight joints between panels.
 3. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
 4. Space fasteners and adhesive as recommended by panel manufacturer.
 5. Conceal fasteners to greatest practical extent.
 6. Arrange panels with grooves and joints over supports.
 - a. Fasten to supports with nails of type and at spacing recommended by panel manufacturer.
 - b. Use fasteners with prefinished heads matching groove color.
- B. Hardboard Paneling: Install according to manufacturer's written instructions.
 1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Butt adjacent panels with moderate contact.
 3. Use fasteners with prefinished heads matching paneling color.
 4. Wood Stud or Furring Substrate: Install with 1-inch annular-ring shank hardboard nails.
 5. Plaster or Gypsum-Board Substrate: Install with 1-5/8-inch annular-ring shank hardboard nails.
 6. Nailing: Space nails 4 inches o.c. at panel perimeter and 8 inches o.c. at intermediate supports unless otherwise required by manufacturer.
- C. Board Paneling: Install according to manufacturer's written instructions.

1. Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.
2. Stagger end joints in random pattern to uniformly distribute joints on each wall.
3. Install with uniform end joints with only end-matched (tongue-and-groove) joints within each field of paneling.
4. Install with uniform end joints. Locate end joints only over furring or blocking.
5. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards.
6. Install with uniform tight joints between boards.
7. Fasten paneling by blind nailing through tongues.

3.5 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.
- C. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
- D. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 2023

SECTION 06 4023

INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Interior stairs and railings.
3. Shop priming of interior architectural woodwork.
4. Shop finishing of interior architectural woodwork.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.
4. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings:

1. Include the following:
 - a. Dimensioned plans, elevations, and sections.
 - b. Attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
4. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each shop-applied color and finish specified.

1. Size:
2. Panel Products: 12 inches by 12 inches (300 mm by 300 mm).
3. Lumber Products: Not less than 5 inches (125 mm) wide by 12 inches (300 mm) long, for each species and cut, finished on one side and one edge.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For architectural woodwork manufacturer and Installer.
- B. Product Certificates: For the following:
 - 1. Composite wood and agrifiber products.
 - 2. Adhesives.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.
 - 1. Installer Qualifications: Manufacturer of products and Licensed participant in AWI's Quality Certification Program.
- 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 mockups of typical interior architectural woodwork as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between and relative humidity between 43 and 70 percent during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork and installation complies with requirements of grades specified.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: Custom.

B. Hardwood Lumber:

1. Wood Species and Cut
 - a. Species: As indicated on the drawings.
 - b. Cut: Plain sliced/plain sawn
2. Wood Moisture Content: 5 to 10 percent.
3. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
4. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.
 - a. For veneered base, use hardwood lumber core, glued for width.
5. For base wider than available lumber, glue for width. Do not use veneered construction.
6. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

C. Softwood Lumber:

1. Wood Species and Cut:
 - a. Species: as indicated on the drawings.
 - b. Cut: Plain sawn.
2. Wood Moisture Content: 5 to 10 percent.
3. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
4. For trim items other than base wider than available lumber, use veneered construction. Do not glue for width.
 - a. For veneered base, use softwood lumber core, glued for width.
5. For base wider than available lumber, glue for width. Do not use veneered construction.
6. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.
7. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.

2.3 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Architectural Woodwork Standards Grade: Custom.

1. Wood Species: Any closed-grain hardwood.
2. Wood Moisture Content: 5 to 10 percent.

2.4 INTERIOR WOOD STAIRS AND RAILINGS

- A. Architectural Woodwork Standards Grade: Custom.
- B. Wood for Transparent Finish: As indicated.
 - 1. Species and cut: as indicated on the drawings.
 - 2. Wood Moisture Content: 5 to 10 percent.
- C. Wood for Opaque Finish:
 - 1. Species: Any closed-grain hardwood.
 - 2. Wood Moisture Content: 5 to 10 percent.
- D. Rough Carriages for Stairs: No. 2 grade, kiln-dried to 15 percent maximum moisture content:
 - 1. Acceptable Species:
 - a. Southern pine.
 - b. Douglas fir-larch.
 - c. Douglas fir-south.
- E. Finishes for Stair Parts: As indicated.
- F. Handrail Brackets: Cast from stainless steel with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Size to provide clearance between handrail and face of wall.
- G. Handrail/Bumper Rail Brackets: Pairs of extruded-aluminum channels: one for fastening to back of rail and one for fastening to face of wall, assembled in overlapping fashion and fastened together at top and bottom with self-tapping screws. Size to provide 1-1/2-inch clearance between handrail and wall.

2.5 HARDWOOD SHEET MATERIALS

- A. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130
 - 2. Softwood Plywood: DOC PS 1, medium-density overlay.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.6 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant-Treated Wood Materials: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products according to test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of the Architectural Woodwork Standards. 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 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, transparent, 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.
 4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
- C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less according to ASTM E 84.
1. For panels thick and less, comply with ANSI A208.1 for Grade M-2, except for the following minimum properties: modulus of rupture, 1600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw-holding capacity on face and edge, 250 and 225 lbf, respectively.
 2. For panels 13/16 to 1-1/4 inches thick, comply with ANSI A208.1 for Grade M-1, except for the following minimum properties: modulus of rupture, 1300 psi; modulus of elasticity, 250,000 psi; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, 250 and 175 lbf, respectively.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard (MDF) panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less according to ASTM E 84.
- E. Use type 304 stainless steel fasteners in all locations with all fire-retardant-treated lumber or sheathing products.

2.7 MISCELLANEOUS MATERIALS

- A. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.

2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.8 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

1. Ease edges to radius indicated for the following:

- a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- b. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

1. Disassemble components only as necessary for shipment and installation.
2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
3. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.

- a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
- b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

D. Stairs: Cut rough carriages to accurately fit treads and risers.

1. Glue treads to risers, and glue and nail treads and risers to carriages.
2. Fabricate stairs with treads and risers no more than 1/8 inch from indicated position and no more than 1/16 inch out of relative position for adjacent treads and risers.

2.9 SHOP PRIMING

A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 09 9000 "Painting."

1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Staining and Finishing Section.

1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 1. Shim as required with concealed shims.
 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.
- F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 1. Secure with countersunk, concealed fasteners and blind nailing.
 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 3. For shop-finished items, use filler matching finish of items being installed.
- H. Standing and Running Trim:
 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 2. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary.
 3. Scarf running joints and stagger in adjacent and related members.

4. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
 5. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- I. Stairs: Securely anchor carriages to supporting substrates.
1. Install stairs with treads and risers no more than 1/8 inch from indicated position.
 2. Secure with countersunk, concealed fasteners and blind nailing.
 3. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.
- J. Railings:
1. Install rails with no more than 1/8 inch in 96-inch variation from a straight line.
 2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.
 3. Wall Rails: Support rails on wall brackets securely fastened to wall framing.
 - a. Space rail brackets not more than 48 inches.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through AWI's Quality Certification Program certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.
1. Inspection entity shall prepare and submit report of inspection.

END OF SECTION 06 4023

SECTION 06 4116

PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-clad architectural cabinets that are not concealed within other construction.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Plastic Laminate
2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Plastic Laminate

C. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.

5. Apply AWI Quality Certification Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and Installer.

B. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

C. Field quality control reports.

1.5 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications: 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.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Licensed participant in AWI's Quality Certification Program.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

B. Architectural Woodwork Standards Grade: Custom

C. Type of Construction: Frameless.

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Formica Corporation
- b. Wilsonart
- c. Nevamar

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade VGS.
4. Edges: Grade HGS.
5. Pattern Direction: As indicated on drawings.

G. Concealed Backs of Panels with Exposed Plastic-Laminate Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.

I. 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 selected by Architect from laminate manufacturer's full range

2.2 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
2. Particleboard: ANSI A208.1, Grade M-2.
3. Straw-Based Particleboard: ANSI A208.1, Grade M-2, except for density.
4. Softwood Plywood: DOC PS 1, medium-density overlay.
5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction as determined by testing performed on identical products by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced quality 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.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 7100 "Door Hardware."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
- F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- G. Shelf Rests: BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.
- H. Drawer Slides: BHMA A156.9.
 1. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 2. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 3. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
- I. Slides for Sliding Glass Doors: BHMA A156.9, B07063; aluminum.
- J. Door Locks: BHMA A156.11, E07121.
- K. Drawer Locks: BHMA A156.11, E07041.
- L. Door and Drawer Silencers: BHMA A156.16, L03011.
- M. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear), Quality-Q3, 6 mm thick unless otherwise indicated.
- N. 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.
- O. Grommets for Cable Passage: 2-inchOD, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. Color: Black, unless noted otherwise on drawings.
- P. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: BHMA 630.
- Q. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesive for Bonding Plastic Laminate: Type informed by fabricator to suit application.

2.6 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Install glass to comply with applicable requirements in Section 08 8000 "Glazing" and in GANA's "Glazing Manual."
1. For glass in frames, secure glass with removable stops.
 2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.
- B. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.

- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.
- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 - 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings 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.
 - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

END OF SECTION 06 4116

SECTION 06 6400

PLASTIC PANELING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic sheet paneling.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories.

1.3 QUALITY ASSURANCE

- A. Testing Agency: Acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PLASTIC SHEET PANELING

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D 5319. Panels shall be USDA accepted for incidental food contact.
 - 1. Products: subject to compliance with requirements, provide one of the following
 - a. Crane Composites, Inc.; Sequentia Flat
 - b. Glasteel; Glassliner FRP Wall Panels
 - c. Marlite; Standard FRP
 - 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E 84. Identify products with appropriate markings from an applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 3. Nominal Thickness: Not less than 0.090 inches.
 - 4. Surface Finish: As selected by Architect from manufacturer's full range.
 - 5. Color: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color: As selected by Architect from manufacturer's full range.
- B. Sealant: sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 9200 "Joint Sealants."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- B. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- C. Lay out paneling before installing. Locate panel joints where indicated.

3.2 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive and nails or staples.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 6400

SECTION 07 1326

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Modified bituminous sheet waterproofing.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Research Reports: For modified bituminous sheet waterproofing/termite barrier, showing compliance with ICC AC308.

C. Sample warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturers.

1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc; VM60
 - b. Carlisle Coatings & Waterproofing Inc; CCW MiraDRI 860/861
 - c. CETC, a Minerals Technologies company; Envirosheet
 - d. GCP Applied Technologies Inc. (formerly Grace Construction Products); Bithene 4000
 - e. Henry Company; Blueskin WP 100
 - f. MAPEI Corporation; Mapethene™ HT.
 - g. Polyguard Products, Inc.; Polyguard 650 Membrane.
 - h. Protecto Wrap Company; PW-100/60.
 - i. Soprema, Inc.; COLPHENE 3000
 - j. Tamko Building Products, Inc.; TW-60
 - k. W.R Meadows, Inc; Mel- Rol.
 2. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154/E 154M.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - g. Water Vapor Permeance: 0.05 perm maximum; ASTM E 96, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.
 3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.2 AUXILIARY MATERIALS

- A. Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.

- B. Primer: Liquid solvent-borne primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch, predrilled at 9 inch centers.

2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer and consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate through the core of 9 to 21 gpm per ft.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Hydrotech, Inc.; Hydrodrain 400
 - b. BASF Corporation; Construction Systems; MasterSeal 975 (Pre-2014: Sonoshield DBS 6200).
 - c. Carlisle Coatings & Waterproofing Inc; CCW MiraDRAIN 6200
 - d. CETGO, a Minerals Technologies company; Aquadrain 15XP.
 - e. GCP Applied Technologies Inc (formerly Grace Construction Products); Hydroduct 220.
 - f. Insulation Solutions, Inc.; AquaCheck DB 1500.
 - g. Polyguard Products, Inc.; Polyflow 10-P
 - h. Urethane Polymers International, Inc.; EZE_DRIAN V-2

2.4 INSULATION DRAINAGE PANELS

- A. Insulation: Comply with Section 07 2100 "Thermal Insulation" for general building insulation, including insulation drainage panels.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

3.2 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and per recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch-minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- E. Seal edges of sheet-waterproofing terminations with mastic.
- F. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- G. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- H. Immediately install protection course with butted joints over waterproofing membrane.
 - 1. Molded-sheet drainage panels or insulation drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.

3.3 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesive or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.4 INSULATION DRAINAGE-PANEL INSTALLATION

- A. Install insulation drainage panels over waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels 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.

3.5 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect installed insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 1326

SECTION 07 2100
THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Extruded polystyrene foam-plastic board.
2. Glass-fiber blanket.
3. Mineral-wool blanket

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. XPS insulation to have an average of 35% recycled content.
2. Batt type insulations shall be formaldehyde free.
3. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Extruded Polystyrene Foam-Plastic Board
 - b. Glass Fiber Blanket
 - c. Mineral Wool Blankets
4. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Extruded Polystyrene Foam-Plastic Board
 - b. Glass Fiber Blanket
 - c. Mineral Wool Blankets

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Research Reports: For foam-plastic insulation, from ICC-ES.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards."
- B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning.
 - 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 GLASS-FIBER BLANKET

- A. Batt type insulations shall be formaldehyde free.
- B. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.
- C. Glass-Fiber Blanket, Kraft Faced: ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.
- D. Glass-Fiber Blanket, Reinforced-Foil Faced: ASTM C 665, Type III (reflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Johns Manville; a Berkshire Hathaway company.
 - c. Owens Corning.

2.3 MINERAL-WOOL BLANKETS

- A. Mineral-Wool Blanket, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Johns Manville; a Berkshire Hathaway company.
 - b. Rockwool International.
 - c. Thermafiber, Inc.; an Owens Corning company.

2.4 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.2 INSTALLATION OF SLAB INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below top of floor slab.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION

- A. Butt panels together for tight fit.
- B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
 - 1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Section 04 2000 "Unit Masonry."

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends. Insulation shall be mechanically supported where required (R-value) blanket dimension exceeds wall cavity.
 - 2. Place insulation in cavities formed by framing members to produce a tight friction fit between edges of insulation and adjoining framing members. Completely fill the voids inside hollow steel stud flanges.
 - 3. Where a direct friction fit is not achievable, insulation must be fit without gaps and held in place with supplemental mechanical support with wires or straps, starting 4'-0" above the floor and then every 2'-0" on center. Where insulation thickness is less than the depth of the stud cavity, the mechanical support should be positioned to hold the batt against the exterior sheathing without compressing it. Continuous mesh support is also acceptable.
 - 4. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 07 2100

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Nonstaining silicone joint sealants.
2. Urethane joint sealants.
3. Immersible joint sealants.
4. Mildew-resistant joint sealants.
5. Butyl Joint Sealants
6. Latex joint sealants.

B. Related Requirements:

1. Section 07 9100 "Preformed Joint Seals" for preformed compressible foam and precured joint seals.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- ###### A. Product Data: For each joint-sealant product.

1. Include manufacturer's printed statement of VOC content in g/l for each sealant and sealant primer.

- ###### B. Manufacturer's installation instructions: indicate special procedures required.

- ###### C. Samples: For each kind and color of joint sealant required.

- ###### D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- ###### A. Product test reports: For each kind of joint sealant, for tests performed by a qualified testing agency.

- ###### B. Preconstruction Laboratory 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 are needed for adhesion.
- C. Preconstruction field-adhesion-test reports. Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- D. Sample warranties. For special warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum three years documented experience and approved by the manufacturer.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone, masonry or other substrates.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates. Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
1. Warranty Period: Five years from date of Substantial Completion.
- C. Include coverage in Warranties for installed sealants and accessories that fail to achieve air-tight seal, exhibit loss of adhesion or cohesion or do not cure.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; Dow Corning® 795 Silicone Building Sealant.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.; Silpruf NB.
 - c. May National Associates, Inc.; a subsidiary of Sika Corporation; Bondaflex Sil 295 FPS NB.
 - d. Pecora Corporation; Pecora 895NST.
 - e. Sika Corporation; Joint Sealants; Sikasil WS-295.
 - f. Tremco Incorporated; Spectrem 2.
- C. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Dow Corning Corporation; Dow Corning® 790 Silicone Building Sealant.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; MasterSeal CR 195 (Pre-2014: Sonolastic Ultra.
 - b. Bostik, Inc; Chem-Calk 915.
 - c. ER Systems; an ITW Company; Pacific Polymers Elasto-Thane 230 MP.
 - d. Everkem Diversified Products, Inc.; AcuraSeal 50 Year Acrylic Urethane Caulk.
 - e. Pecora Corporation; Dynatrol I-XL.
 - f. Polymeric Systems, Inc; Flexiprene 1000.
 - g. Schnee-Morehead, Inc., an ITW company; Permathane SM7108.
 - h. Sika Corporation; Joint Sealants; Sikaflex Textured Sealant.

- i. Tremco Incorporated; Dymonic.
- B. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; MasterSeal SL 1 (Pre-2014: Sonolastic SL1).
 - b. Pecora Corporation; NR-201.
 - c. Polymeric Systems, Inc; Flexiprene 952.
 - d. Schnee-Morehead, Inc., an ITW company; Permthane SM7101.
 - e. Sherwin-Williams Company (The); Stampede 1SL.
- C. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; MasterSeal SL 2 (Pre-2014: Sonolastic SL2).
 - b. Bostik, Inc; Chem-Calk 555-SL.
 - c. LymTal International Inc; Iso-Flex 880 GB.
 - d. Pecora Corporation; Dynatrol II SG or Urexpan NR 200.
 - e. Sherwin-Williams Company (The); Stampede-2SL.
 - f. Sika Corporation; Joint Sealants; Sikaflex 2c SL.
 - g. Tremco Incorporated; THC 900/901.

2.4 IMMERSIBLE JOINT SEALANTS

- A. Urethane, Immersible, S, P, 25, T, NT, I: Immersible, single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T, NT, and I.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Sika Corporation; Joint Sealants; Sikaflex 1c SL.
 - b. Tremco Incorporated; Vulkem 45.
 - c. W.R. Meadows, Inc; Pourthane SL.
- B. Urethane, Immersible, M, P, 25, T, NT, I: Immersible, multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T, NT, and I.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corp. - Construction Chemicals; MasterSeal SL 2 (Pre-2014: Sonolastic SL2).
 - b. LymTal International Inc; Iso-Flex 880 GB.
 - c. Sika Corporation; Joint Sealants; Sikaflex 2c SL.

2.5 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Adfast; Adseal 4800.
 - b. Dow Corning Corporation; DOW CORNING® 786 SILICONE SEALANT -.
 - c. GE Construction Sealants; Momentive Performance Materials Inc.; SCS1700 Sanitary.
 - d. May National Associates, Inc.; a subsidiary of Sika Corporation; Bondaflex Sil 100 WF.
 - e. Pecora Corporation; Pecora 860.
 - f. Soudal USA; RTV GP.
 - g. Tremco Incorporated; Tremsil 200.

2.6 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C1311nondrying, nonskinning, noncuring.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora: BA-98.
 - b. Tremco: Trempro JS 773.

2.7 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Everkem Diversified Products, Inc.; SilTex 40 Siliconized Acrylic Latex Caulk.
 - b. Franklin International; Titebond UA 920 Sealant.
 - c. Pecora Corporation; AC-20.
 - d. Sherwin-Williams Company (The); 950A Siliconized Acrylic Latex Caulk, White.
 - e. Tremco Incorporated; Tremflex 834.

2.8 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.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Adfast.
 - b. Alcot Plastics Ltd.
 - c. BASF Corp. - Construction Chemicals.
 - d. Construction Foam Products; a division of Nomaco, Inc.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove laitance and form-release agents from concrete.
 - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated. All sealant joints shall have a clean, smooth surface, uniform thickness and craftsman like aesthetic.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform 10 tests for the first 1000 feet of joint length for each kind of 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 according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints in brick pavers.
 - b. Isolation and contraction joints in cast-in-place concrete slabs.
 - c. Joints between plant-precast architectural concrete paving units.
 - d. Joints in stone paving units, including steps.
 - e. Tile control and expansion joints.
 - f. Joints between different materials listed above.
 - g. Other joints as indicated on Drawings.
 - 2. Joint Sealant: Urethane, S or M, P, 25, T, X, M, A.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
 - 1. Joint Locations:

- a. Joints in pedestrian plazas.
 - b. Joints in swimming pool decks.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, immersible, S or M, P, 25, T, NT, I.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: General purpose exterior sealant.
 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete.
 - b. Joints between plant-precast architectural concrete units.
 - c. Control and expansion joints in unit masonry.
 - d. Joints in dimension stone cladding.
 - e. Joints between metal or aluminum frames and other materials.
 - f. Other exterior joints for which no other sealant is indicated or specified.
 2. Joint Sealant: Urethane, NS, 25, NT, M, G, A.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 1. Joint Locations:
 - a. Isolation joints in cast-in-place concrete slabs.
 - b. Control and expansion joints in stone flooring.
 - c. Control and expansion joints in tile flooring.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, P, 25, T, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement. General purpose sealant.
 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - c. Interior wall and ceiling control joints.
 - d. Other interior joints for which no other type of sealant is indicated or specified.
 2. Joint Sealant: Acrylic latex: Type NF, paintable.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Tile control and expansion joints where indicated.
 - c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Concealed mastics.
1. Joint Locations:
 - a. Aluminum thresholds.
 - b. Sill plates.
 - c. Concealed sealant bead in sheet metal work.
 - d. Concealed sealant bead in siding overlaps.
 - e. Other joints as indicated on Drawings.
 2. Joint Sealant: Butyl-rubber based, non-drying, non-skinning and non-curing.
 3. Joint-Sealant Color: As indicated by manufacturer's designations.
- H. Joint-Sealant Application: Exterior Joints in Metal Components.
1. Joint Locations:
 - a. Composite metal panel joints.
 - b. Joints in storefront, curtainwall, door exterior joints.
 2. Joint Sealant: Silicone, ASTM C920, NS, 25, NT, A, G, M, O.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- I. Joint-Sealant Application: Exterior Joints in EIFS.
1. Joint Locations:
 - a. EIFS joints.
 2. Joint Sealant: Silicone, ASTM C920, NS, 100/50, T, NT, A, G, M, O.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 07 9200

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 08 7100 "Door Hardware" for door hardware for hollow-metal doors.

1.2 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

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. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Interior Standard Steel Doors and Frames
 - b. Exterior Standard Steel Doors and Frames
2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Interior Standard Steel Doors and Frames
 - b. Exterior Standard Steel Doors and Frames

- C. Shop Drawings: Include the following:

1. Elevations of each door type.
 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.5 INFORMATIONAL SUBMITTALS

- A. Product test reports. For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ceco Door; ASSA ABLOY.
 - b. DE LA FONTAINE.
 - c. Republic Doors and Frames.
 - d. Steelcraft; an Allegion brand.
 - e. Technical Glass Products.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames for fire rated locations: SDI A250.8, Level 2; SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.

1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch.
 - d. Edge Construction: Model 1, Full Flush
 - e. Core: Manufacturer's standard.
 - f. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Slip-on drywall at gypsum walls and Face welded at CMU walls.

2.4 EXTERIOR STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A.

1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - d. Edge Construction: Model 2, Seamless.
 - e. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - f. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - g. Core: Manufacturer's standard.
 - h. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A60 coating.
 - b. Construction: Face welded.

2.5 BORROWED LITES

1. Fabricate of uncoated steel sheet, minimum thickness of 0.042 inch.
2. Construction: Face welded.

- B. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- C. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Material: ASTM A 879, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008 or ASTM A 1011; hot-dip galvanized according to ASTM A 153, Class B.

2.7 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- D. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B.
- E. Inserts, Bolts, and Fasteners: Hot dip galvanized according to ASTM A 153.
- F. 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 hollow-metal frames of type indicated.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- H. Glazing: Comply with requirements in Section 08 8000 "Glazing."

2.8 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
 - 3. Provide reinforcing for surface mounted closer hardware not requiring through bolts.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with beveled or square stops unless otherwise indicated.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 - 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 - 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.9 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.10 LOUVERS

- A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch-thick, cold-rolled steel sheet set into 0.032-inch-thick steel frame.
 - 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
 - 2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
 - 3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames according to NFPA 80.
 - 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 4. Solidly pack mineral-fiber insulation inside frames.

5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 3. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 8000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 1113

SECTION 08 1416
FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer and plastic-laminate faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 08 1213 "Hollow Metal Frames" for hollow metal frames for flush wood doors.
2. Section 08 4113 "Aluminum-Framed Entrances and Storefronts" for aluminum entrance and storefront frames for flush wood doors.
3. Section 08 7110 "Door Hardware" for door hardware for flush wood doors.
4. Section 08 8000 "Glazing" for glass view panels in flush wood doors.

1.2 PREINSTALLATION MEETINGS

1. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include factory-finishing specifications.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Flush Wood Doors
 - b. Veneer-Faced Doors for Transparent Finish
 - c. Doors for Opaque Finish
 - d. Plastic-Laminate-Faced Doors
2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Flush Wood Doors
 - b. Veneer-Faced Doors for Transparent Finish
 - c. Doors for Opaque Finish
 - d. Plastic-Laminate-Faced Doors

- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
1. Door schedule indicating door and frame location, type, size, fire protection rating, and swing.
 2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
 3. Details of frame for each frame type, including dimensions and profile.
 4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
 5. Dimensions and locations of blocking for hardware attachment.
 6. Dimensions and locations of mortises and holes for hardware.
 7. Clearances and undercuts.
 8. Requirements for veneer matching.
 9. Doors to be factory finished and application requirements.
 10. Apply **AWI Quality Certification** Program label to Shop Drawings.
- D. Samples: For plastic-laminate door faces and factory-finished doors.
1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), 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 finished Work.
 2. Plastic laminate, 6 inches (150 mm) square, for each color, texture, and pattern selected.

1.4 INFORMATIONAL SUBMITTALS

- A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Exterior Doors: Two years from date of Substantial Completion.
 4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Ampcon by AJW.
 - 2. Eggers Industries.
 - 3. Haley Brothers, Inc.
 - 4. Marshfield DoorSystems, Inc.
 - 5. Poncraft Door Company.
 - 6. VT Industries Inc.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards or WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
- 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. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 3. 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.
- D. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
- E. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-2, made with binder containing no urea-formaldehyde.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - 3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- F. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.

G. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Exterior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: As indicated on the drawings.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Center-balance match.
6. Pair: Provide for doors hung in same opening and set match: doors within 10 feet of each other.
7. Core: Either glued wood stave or structural composite lumber.
8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
9. Adhesives: Type I per WDMA T.M.-6.

B. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: As indicated on the drawings.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair: Provide for doors hung in same opening or separated only by mullions and set match for doors within 10 feet of each other.
7. Core: Particleboard.
8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.4 DOORS FOR OPAQUE FINISH

A. Exterior Solid-Core Doors:

1. Grade: Custom.
2. Faces: MDO.
3. Core: Either glued wood stave or structural composite lumber.
4. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.
5. Adhesives: Type I per WDMA T.M.-6.

B. Interior Solid-Core Doors:

1. Grade: Custom.
2. Faces: MDO.
3. Core: Particleboard

4. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.5 PLASTIC-LAMINATE-FACED DOORS

- A. Interior Solid-Core Doors:
 1. Grade: Custom.
 2. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS.
 3. Colors, Patterns, and Finishes: As selected by Architect from laminate manufacturer's full range of products.
 4. Exposed Vertical Edges: Plastic laminate that matches faces, applied before faces.
 5. Core: Particleboard.
 6. 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.

2.6 LIGHT FRAMES AND LOUVERS

- A. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- B. Wood Louvers:
 1. Material and Finish: Same species as door
 2. Louver Blade: Flush Louver

2.7 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
 1. Locate hardware to comply with DHI-WDHS-3.
 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels:

1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors.
2. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
3. Fabricate door and transom panels with full-width, solid-lumber, meeting rails.
4. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.

D. Openings: Factory cut and trim openings through doors.

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 Section 08 8000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.8 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in Section 09 9000 "Painting."

2.9 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted at edges of cutouts, and mortises.
- B. Factory finish doors that are indicated to receive transparent finish.
- C. Transparent Finish:
1. Grade: Custom.
 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish
 3. Staining: As selected by Architect from manufacturer's full range.
 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 08 7100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
1. Install fire-rated doors according to NFPA 80.
 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08 1416

SECTION 08 3113
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of access door and frame and for each finish specified, 6 x 6 inches.
- C. Product Schedule: For access doors and frames. Use same designations indicated on Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection and temperature-rise limit ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Exposed Flanges for masonry wall application:
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Acudor Products, Inc; Acudor UR – 5000
 - b. Cendrex Inc
 - c. Karp Associates, Inc.
 - d. Milcor; Commercial Products Group of Hart & Cooley, Inc.
 - 2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
 - 3. Locations: Wall.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
 - 5. Latch and Lock: Cam latch, screwdriver operated.
- B. Flush Access Doors with Concealed Flanges for drywall applications:
 - 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Acudor Products, Inc; Acudor DW – 5058
 - b. Cendrex Inc
 - c. Karp Associates Inc.
 - d. Milcor: Commercial Products Group of Hart & Cooley, Inc.
2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 3. Locations: Wall.
 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch, 16 gage, factory primed.
 5. Latch and Lock: Cam latch, screwdriver operated.

C. Lightweight Flush Access Doors for drywall ceiling applications.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Acudor Products, Inc; Acudor GFRG – SH
 - b. Karp Associates, Inc.
 - c. Milcor; Commercial Products Group of Hart & Cooley, Inc
 - d. Castle Accessories Panels & Forms, Inc.
2. Description: Face of door flush with hidden flange for gypsum board construction surrounding finished surface.
3. Locations: Ceiling.
4. Glass fiber reinforced gypsum door: .125-inch - .375-inch thickness.
5. Glass fiber reinforced frame: .125 inch - .375 inch thickness.
6. Latch and Lock: Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Exposed Flanges for wall and ceiling applications.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Acudor Products, Inc.
 - b. Cendrex Inc.
 - c. Karp Associates, Inc.; <Insert product designation>
 - d. Milcor; Commercial Products Group of Hart & Cooley, Inc.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and concealed hinge.
3. Locations: Wall and ceiling.
4. Fire-Resistance Rating: Not less than that of adjacent construction.
5. Temperature-Rise Rating 250 deg F at the end of 30 minutes.
6. Uncoated Steel Sheet for Door: 16 gage cold rolled steel frame, 20 gage galvanized steel, factory primed.
7. Latch and Lock: Self-latching door hardware, operated by key.

2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.

- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879, with cold-rolled steel sheet substrate complying with ASTM A 1008, Commercial Steel (CS), exposed.
- C. Frame Anchors: Same material as door face.
- D. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153 or ASTM F 2329.

2.5 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 mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- 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.

2.6 FINISHES

- A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION 08 3113

SECTION 08 7100

DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - b. Sliding doors.
 - c. Folding doors.
2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Requirements:

1. Section 081113 "Hollow Metal Doors and Frames" for astragals provided as part of labeled fire-rated assemblies and for door silencers provided as part of hollow-metal frames.
2. Section 081416 "Flush Wood Doors" for astragals provided as part of labeled fire-rated assemblies.
3. Section 081433 "Stile and Rail Wood Doors" for astragals provided as part of labeled fire-rated assemblies.
4. Section 083113 "Access Doors and Frames" for access door hardware, except cylinders.
5. Section 083323 "Overhead Coiling Doors" for door hardware provided as part of overhead coiling door assemblies.
6. Section 083326 "Overhead Coiling Grilles" for door hardware provided as part of overhead coiling grille assemblies.
7. Section 084113 "Aluminum-Framed Entrances and Storefronts" for entrance door hardware, except items referenced to this section.
8. Section 084126 "All-Glass Entrances and Storefronts" for entrance door hardware, except items referenced to this section.
9. Section 084229.23 "Sliding Automatic Entrances" for entrance door hardware, except items referenced to this section.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For electrified door hardware.
 - 1. Include diagrams for power, signal, and control wiring.
 - 2. Include details of interface of electrified door hardware and building safety and security systems.
- C. Samples: For each exposed product in each finish specified.
- D. Door hardware schedule. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
- E. Keying schedule.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample warranty. For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data. For each type of door hardware to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedule.
 - 2. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion unless otherwise indicated below:
 - a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.
 - c. Concealed Floor Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is 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.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg of water.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design" and the local standards of the local and state jurisdiction having authority.
 - 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
 - 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 - 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 - 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.2 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements indicated in Part 2 and door hardware schedule.
 - 1. Door hardware scheduled is attached to specifications.

2.3 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc
 - b. Baldwin Hardware Corporation
 - c. Bommer Industries, Inc
 - d. Hager Companies
 - e. McKinney Products Company; an ASSA ABLOY Group company
 - f. Stanely Commercial Hardware; a division of Stanley Security Solutions; Div of The Stanley Works.

2.4 CONTINUOUS HINGES

- A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- B. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
1. Products: Subject to compliance; series 780
 - a. Allegion plc.
 - b. Bommer Industries, Inc.
 - c. Hager Companies; Series 780
 - d. McKinney Products Company; an ASSA ABLOY Group company.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.5 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Lock Backset: 2-3/4 inches unless otherwise indicated.
- D. Lock Trim:
1. Description: As indicated on Drawings.
 2. Levers: Cast.
 3. Escutcheons (Roses): Wrought.

4. Dummy Trim: Match lever lock trim and escutcheons.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- F. Bored Locks: BHMA A156.2; Grade 1 or Grade 2 as scheduled; Series 4000.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. DORMA USA, Inc.
 - d. SARGENT Manufacturing Company; ASSA ABLOY.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- G. Mortise Locks: BHMA A156.13; Operational Grade 1 or Operational Grade 2 as scheduled; stamped steel case with steel or brass parts; Series 1000.
1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. DORMA USA, Inc.
 - d. SARGENT Manufacturing Company; ASSA ABLOY.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.6 AUXILIARY LOCKS

- A. Bored Auxiliary Locks: BHMA A156.36: Grade 1 or Grade 2, as indicated; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.
 - d. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.7 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.
 - d. Stanley Commercial Hardware; a division of Stanley Security Solutions.
 2. Type: Bored.

2.8 SURFACE BOLTS

- A. Surface Bolts: BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Don-Jo Mfg., Inc.

2.9 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Don-Jo, Mfg., Inc.

2.10 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. DORMA ISA Inc.
 - d. SARGENT Manufacturing Company; ASSA ABLOY.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.11 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinders from same manufacturer of locking devices.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Best Access Systems: Stanley Security Solutions, Inc.
 - c. SARGENT Manufacturing Company; ASSA ABLOY
 - d. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1 cores; face finished to match lockset.
 - 1. Core Type: Removable.
- C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- D. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.12 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.
 - 1. Master Key System: Change keys and a master key operate cylinders.
 - a. Provide three cylinder change keys and five master keys.
 - 2. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - a. Provide three cylinder change keys and five each of master and grand master keys.
- B. Keys: Nickel silver.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."

2.13 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.28; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of equal to actual quantity of keys plus 10% additional capacity.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. American Key Boxes and Cabinets
 - b. GE Security, Inc.
 - c. HPC, Inc.
 - d. Lund Equipment Co., Inc
 - e. MMF Industries
 - f. TelKee; Oasis International
 - 2. Multiple-Drawer Cabinet: Grade 1 cabinet with drawers equipped with key-holding panels and key envelope storage, and progressive-type ball-bearing suspension slides. Include single cylinder lock to lock all drawers.
 - 3. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

2.14 KEY LOCK BOX

- A. Key Lock Box: Exterior wall mount lock box with metal body and weather cover. Box shall have resettable combination push button design.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Master Lock Model Number 5423D.
 - 2. Size: 3 1/8 inch wide lock body
 - 3. Internal dimensions: 3 1/2 inch height, 2 1/4 inch width, 1 inch depth.
 - 4. Box to be located at or near a door as indicated on the drawings or at the Owners or Architects direction.

2.15 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel unless otherwise indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc
 - b. Don-Jo Mfg., Inc
 - c. Hager Companies
 - d. Rockwood Manufacturing Company; an ASSA ABLOY Group Company.

2.16 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.
- B. Astragals: BHMA A156.22.

2.17 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force. Provide closers to be mounted utilizing hardware without the use of through bolts.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc
 - b. DORMA USA, Inc.
 - c. Hager Companies.
 - d. SARGENT Manufacturing Company; ASSA ABLOY.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.
- B. NOTE: SURFACE CLOSERS SHALL BE PLACED ON THE MORE PRIVATE SIDE OF THE DOOR.

2.18 CONCEALED CLOSERS

- A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. DORMA USA, Inc.
 - c. SARGENT Manufacturing Company; ASSA ABLOY.

2.19 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Baldwin Hardware Corporation.
 - c. Don-Jo Mfg., Inc.
 - d. Hager Companies.
 - e. Rockwood Manufacturing Company; an ASSA ABLOY Group Company.

2.20 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. DORMA USA, Inc.
 - c. Hager Companies; Series 7000
 - d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - e. SARGENT Manufacturing Company; ASSA ABLOY.

2.21 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. M-D Building Products, Inc.
 - b. National Guard Products, Inc.
 - c. Pemko Manufacturing Co.
 - d. Reese Enterprise, Inc.

B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:

1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

2.22 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. M-D Building Products, Inc.
 - b. National Guard Products, Inc.

- c. Pemko Manufacturing Co.
- d. Reese Enterprise, Inc.

2.23 SLIDING DOOR HARDWARE

- A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arthur Cox & Sons, Inc.
 - b. Hager Companies.
 - c. Johnson, L. E., Products, Inc.
 - d. PC Henderson Inc.
 - e. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.24 FOLDING DOOR HARDWARE

- A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arthur Cox & Sons, Inc.
 - b. Johnson, L. E., Products, Inc.
 - c. PC Henderson Inc.

2.25 AUXILIARY DOOR HARDWARE

- A. Auxiliary Hardware: BHMA A156.16.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allegion plc.
 - b. Baldwin Hardware Corporation.
 - c. Don-Jo Mfg., Inc.
 - d. Hager Companies.
 - e. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
 - f. Trimco.

2.26 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
- F. Key Control System:
 - 1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 - 2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
 - 3. Key Control System Software: Set up multiple-index system based on final keying schedule.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in mastic tape for full length.
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 1. Do not notch perimeter gasketing to install other surface-applied hardware.
- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.2 ADJUSTING

- A. Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.3 DOOR HARDWARE SCHEDULE: See Section 08 7110

END OF SECTION 08 7100

SECTION 08 8000

GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for:
 - a. windows,
 - b. doors,
 - c. interior borrowed lites,
 - d. storefront framing,
 - e. glazed curtain walls,
 - f. sloped glazing,
 - g. skylights.
2. Glazing sealants and accessories.

B. Related Requirements:

1. Section 05 7313 "Glazed Decorative Metal Railings" for glazing in railings.
2. Section 08 4126 "All-Glass Entrances and Storefronts."
3. Section 08 4113 "Aluminum-Framed Entrances and Storefronts"
4. Section 08 4229 "Sliding Automatic Entrances"
5. Section 08 4333 "Folding Glass Storefronts"
6. Section 08 4413 "Glazed Aluminum Curtain Walls"
7. Section 08 4423 "Structural Glass Curtain Walls" for glazing sealants used in structural-sealant-glazed curtain walls.
8. Section 08 6300 "Metal-Framed Skylights"
9. Section 08 8300 "Mirrors."

1.2 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.3 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site. Coordinate Glazing Preinstallation Conference with those of other trades that incorporate glazing.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Glass Products
 - b. Insulating Glass Units
 - c. Laminated glass
 - 2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Glass Products
 - b. Insulating Glass Units
 - c. Laminated glass
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- D. Glazing Accessory Samples: For sealants and spacers, in 12-inch (300-mm) lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.
- B. Sample Warranties: For special warranties.

1.7 QUALITY ASSURANCE

- A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.9 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.
- 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: 10 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 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. AGC Glass Company North America, Inc.
 2. Cardinal Glass Industries.
 3. Guardian Glass SunGuard.
 4. Pilkington North America.
 5. PPG Industries, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design glazing.
- B. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.
 - 1. Design Wind Pressures: As indicated on Drawings.
 - 2. Design Snow Loads: As indicated on Drawings.
 - 3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 - 4. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Windborne-Debris-Impact Resistance: Exterior glazing shall comply with requirements as indicated on the structural drawings. Test specimens shall be no smaller in width and length than glazing indicated for use on Project and shall be installed in same manner as glazing indicated for use on Project.
 - 1. Large-Missile Test: For glazing located within 30 feet of grade.
 - 2. Small-Missile Test: For glazing located more than 30 feet above grade.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
 - 2. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - 3. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 - 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- 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. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Ultraclear Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent.
- C. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.
- D. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- E. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
- F. Ceramic-Coated Vision Glass: ASTM C 1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in NGA's "Engineering Standards Manual."
- G. Reflective- and Low-E-Coated Vision Glass: ASTM C 1376.
- H. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.
- I. Reflective- and Low-E-Coated Spandrel Glass: ASTM C 1376, Kind CS.

2.5 LAMINATED GLASS

- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 3. Interlayer Color: Clear unless otherwise indicated.
- B. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:
 - 1. Construction: Laminate glass with polyvinyl butyral interlayer reinforced with polyethylene terephthalate film to comply with interlayer manufacturer's written instructions.

2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
3. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 1. Sealing System: Dual seals.
 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Technoform Glass Insulation NA.; TGI-Spacer
 - 2) Thermix; s brand of Ensinger USA; Thermix

2.7 GLAZING SEALANTS

- A. General:
 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Bostik, Inc.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. Pecora Corporation.

2.8 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

2.9 MISCELLANEOUS GLAZING MATERIALS

- A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

- B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Provide spacers for glass lites where length plus width is larger than 50 inches.
- F. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

- E. 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.

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.5 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

- C. Remove and replace glass that is damaged during construction period.

3.6 GLASS SCHEDULE

- A. See drawings for Glazing schedule and glazing notes.

END OF SECTION 08 8000

SECTION 08 8300

MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Annealed monolithic glass mirrors.
- B. Related Requirements:
 - 1. Section 08 8000 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
 - 2. Section 10 2800 "Toilet, Bath, and Laundry Accessories" for metal-framed mirrors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- C. Samples: For each type of the following:
 - 1. Mirrors: square, including edge treatment on two adjoining edges.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Avalon Glass and Mirror Company.
2. Gardner Glass, Inc.
3. Guardian Glass; SunGuard.
4. National Glass Industries.
5. Trulite Glass & Aluminum Solutions, LLC.
6. Walker Glass Co., Ltd.
7. Bobrick Washroom Equipment Inc.

2.2 SILVERED FLAT GLASS MIRRORS

A. Mirrors, General: ASTM C 1503.

1. Nominal Thickness: 6.0 mm.

2.3 MISCELLANEOUS MATERIALS

A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

B. Edge Sealer: Coating approved by mirror manufacturer.

C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

2.4 MIRROR HARDWARE

A. Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover edges of mirrors in a single piece.

1. Bottom: As needed based on glass size, J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively, and a thickness of not less than 0.04 inch.
2. Finish: Clear bright anodized.

B. Mirror Bottom Clips: None, or as indicated.

C. Mirror Top Clips: None, or as indicated.

D. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.

2.5 FABRICATION

- A. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- B. Mirror Edge Treatment: Flat polished. Seal edges of mirrors with edge sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of existing finishes or primers with mirror mastic.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - 1. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
- C. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 8300

SECTION 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Exterior gypsum board for ceilings and soffits.
3. Sound attenuation blankets.
4. Acoustical Joint Sealants

B. Related Requirements:

1. Section 06 1600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 09 2116 "Gypsum Board Shaft Wall Assemblies" for shaft assemblies and assemblies install from only one side.
3. Section 09 3013 "Ceramic Tiling" for Tile Backing Panels.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Interior Gypsum Board
 - b. Exterior Gypsum Board for Ceilings, Soffits, or Other Applications.
2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Interior Gypsum Board
 - b. Exterior Gypsum Board for Ceilings, Soffits, or Other Applications.

C. Samples: For each texture finish indicated on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Wallboard: ASTM C 1396.
 - 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 Gypsum LLC.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Building Products by Georgia-Pacific.
 - h. USG Corporation.
 - 2. Thickness: 5/8 inch
 - 3. Long Edges: Tapered.
- B. Gypsum Board, Type X: ASTM C 1396.
 - 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 Gypsum LLC.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Building Products by Georgia-Pacific.
 - h. USG Corporation.
 - 2. Thickness: 5/8 inch.
 - 3. Long Edges: Tapered.

- C. Flexible Gypsum Board: ASTM C 1396. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Continental Building Products, LLC.
 - c. Georgia-Pacific Gypsum LLC.
 - d. National Gypsum Company.
 - e. PABCO Gypsum.
 - f. Temple-Inland Building Products by Georgia-Pacific.
 - g. USG Corporation.
 2. Thickness: 1/4 inch.
 3. Long Edges: Tapered.
- D. Gypsum Ceiling Board: ASTM C 1396.
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 Gypsum LLC.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Building Products by Georgia-Pacific.
 - h. USG Corporation.
 2. Thickness: 1/2 inch.
 3. Long Edges: Tapered.
- E. Mold-Resistant Gypsum Board: ASTM C 1396. With moisture- and mold-resistant core and paper surfaces.
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 Gypsum LLC.
 - e. National Gypsum Company.
 - f. PABCO Gypsum.
 - g. Temple-Inland Building Products by Georgia-Pacific.
 - h. USG Corporation.
 2. Core: 5/8 inch, Type X.
 3. Long Edges: Tapered.
 4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.
- F. Abuse-Resistant Gypsum Board: ASTM C 1396/C 1396M gypsum board, tested according to ASTM C 1629/C 1629M.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Gypsum LLC.
 - c. National Gypsum Company.

- d. USG Corporation.
2. Core: 5/8 inch, Type X.
3. Surface Abrasion: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
4. Indentation: ASTM C 1629/C 1629M, meets or exceeds Level 1 requirements.
5. Soft-Body Impact: ASTM C 1629/C 1629M, meets or exceeds Level 2 requirements.
6. Long Edges: Tapered.
7. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS, SOFFITS, OTHER APPLICATIONS

- A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Gypsum.
 - b. CertainTeed Corporation.
 - c. Continental Building Products, LLC.
 - d. Georgia-Pacific Gypsum LLC.
 - e. National Gypsum Company.
 - f. Temple-Inland Building Products by Georgia-Pacific.
 - g. USG Corporation.
 2. Core: Regular type; or as indicated on drawings, Type X.

2.5 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc
 2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion joint.
 - g. Control Joint.
 - h. Curved-Edge Cornerbead: With notched or flexible flanges.
 - i. F-bead where indicated on the drawings.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Glass-Mat Gypsum Sheathing Board: as indicated in 06 1600 "Sheathing".
 3. Tile Backing Panels: As indicated in 09 3013 "Ceramic Tiling".

- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 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 setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: as indicated in 06 1600 "Sheathing".
 - 2. Cementitious Backer Units: As indicated in 09 3013 "Ceramic Tiling".

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- 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 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 glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Accumetric LLC.
 - b. Everkem Diversified Products, Inc.
 - c. Franklin International.
 - d. Grabber Construction Products.
 - e. Hilti, Inc.
 - f. Pecora Corporation.
 - g. Specified Technologies, Inc.
 - h. USG Corporation.
- F. Thermal Insulation: As specified in Section 07 2100 "Thermal Insulation."

- G. Vapor Retarder: As specified in Section 07 2600 "Vapor Retarders."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Control Joints:
 - 1. Locate control joints as indicated on the drawings. If not indicated comply with the following:
 - a. A control joint shall be installed where a partition, wall, or ceiling traverses a construction joint (expansion, seismic or building control element) in the base building structure.
 - b. Control joints shall be installed where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.
 - c. Control joints in interior ceilings with perimeter relief shall be installed so that linear dimensions between control joints do not exceed 50 ft and total area between control joints does not exceed 2500 sq ft.
 - d. Control joints in interior ceilings without perimeter relief shall be installed so that linear dimensions between control joints do not exceed 30 ft and total area between control joints does not exceed 900 sq ft.
 - e. Control joints in exterior ceilings and soffits shall be installed so that linear dimensions between control joints do not exceed 30 ft (9100 mm) and total area between control joints does not exceed 900 sq ft
- D. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-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.
- E. 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.
- F. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- G. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- H. 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, panels that are substrate for acoustical tile or where indicated on Drawings.
 - 3. Level 3: Where indicated on Drawings.
 - 4. Level 4: At any and all panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 09900 "Painting."

5. Level 5: Walls and ceilings to receive semi-gloss paint finish, gloss paint finish, vinyl wall covering, vinyl graphics and other areas specifically indicated on the drawings.
 - a. Primer and its application to surfaces are specified in Section 09 9000 "Painting."

3.2 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

3.3 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.

END OF SECTION 09 2900

SECTION 09 3013

CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tile for floor applications.
2. Tile for wall applications.
3. Tile for shower receptors.
4. Tile accessories.
5. Stone thresholds.
6. Tile backing panels.
7. Waterproof membrane.
8. Crack isolation membrane.
9. Metal edge strips.

B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show locations, plans, and elevations, of each type of tile and tile pattern. Show widths, details, and locations of movement joints in tile substrates and finished tile surfaces. Show thresholds.

C. Samples for Verification:

1. Each type and composition of tile and for each color and finish required.
2. For grout, and accessories involving color selection.
3. Stone thresholds.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
 - 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.
 - 3. Installer employs Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS

- A. Manufacturers: All products by the same manufacturer.
 - 1. Basis of Design: Manufacturer and product are listed in the Finish Schedule on the drawings.
 - 2. No substitutions will be considered unless indicated on the drawings.

2.3 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile: same manufacturer as tile.
- B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
 - 1. Applications:
 - a. Open edges: Bullnose.

- b. Inside corners: Jointed.
 - c. Floor to wall joints: Cove base.
 - 2. Manufacturers: Same as for tile.
- C. Non-Ceramic Trim: material and finish as indicated on the drawings, style and dimension to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Open edges of wall tile.
 - b. Open edges of floor tile.
 - c. Wall corners, outside and inside.
 - d. Transition at door openings.
 - e. Expansion and control joints, floor, and wall.
 - f. Borders and other trim as indicated on drawings.
 - 2. Manufacturers:
 - a. Schluter Systems: www.schluter.com.
 - 1) Schiene, Tile edge protection and transitions. Satin anodized aluminum or satin stainless steel.
 - 2) Trep-E, Stair nosing profile.
 - 3) Reno-U, Floor transition. Satin anodized aluminum or satin stainless steel.
 - 4) Reno-T, Floor transition. Satin anodized aluminum or satin stainless steel.
 - 5) Dilex cove Base. Satin anodized aluminum or satin stainless steel.
 - 6) Rondec, Outside corner and top of tile termination.
 - b. Mortar backfill shall be provided on all Schluter System trim pieces that recommend or require mortar back fill.

2.4 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Granite Thresholds: ASTM C615/C615M, with honed finish. Color as indicated on drawings.
- C. Marble Thresholds: ASTM C503/C503M, with a minimum abrasion resistance of 12 according to ASTM C1353 or ASTM C241/C241M and with honed finish. Color as indicated on drawings.

2.5 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Georgia-Pacific Gypsum LLC.
 - b. USG Corporation.
 - 2. Thickness: 5/8 inch unless noted otherwise on drawings.
- B. Fiber-Cement Backer Board: ASTM C1288, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. James Hardie Building Products, Inc.

2.6 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following, which complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American, an Oldcastle company.
 - b. Bostik, Inc.
 - c. H.B. Fuller Construction Products Inc. / TEC.
 - d. MAPEI Corporation.
 - e. Parex USA, Inc.
 - f. Southern Grouts & Mortars, Inc.
 - g. Summitville Tiles, Inc.

2.7 CRACK ISOLATION AND UNCOUPLING MEMBRANE

- A. General: Manufacturer's standard product that complies with ANSI A118.10 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Polyethylene decoupling Membrane: System consisting of polyethylene grid structure 1/8-inch-thick with anchoring fleece backing.
 - 1. Products: Subject to compliance with requirements, provide the following in all floor locations that receive large format (>12" x 12") tile and/or all locations that bear vehicle traffic:
 - a. SCHLUTER; DITRA isolation and uncoupling membrane.

2.8 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

- B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas.
 - b. Custom building Products.
 - c. LATICRETE.
 - d. Mapei Corporation
 - e. Merkrete by Parex USA, Inc.
 - f. ProSpec, an Oldcastle brand.
 - 2. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
 - 3. For wall applications, provide nonsagging mortar.

2.9 GROUT MATERIALS

- A. High-Performance Tile Grout: ANSI A118.7.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas.
 - b. Custom Building Products.
 - c. LATICRETE.
 - d. Mapei Corporation
 - e. Merkrete, by Parex USA, Inc.
 - f. ProSpec, an Oldcastle brand.
 - 2. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.
- B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ARDEX Americas.
 - b. Custom Building Products.
 - c. LATICRETE.
 - d. MAPEI Corporation.
 - e. Merkrete; a Parex USA, Inc. brand.
 - 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F (60 and 100 deg C), respectively, and certified by manufacturer for intended use.
- C. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.10 MISCELLANEOUS MATERIALS

- A. Self-Leveling Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials 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 the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile floors consisting of tiles 8 by 8 inches or larger.
 - d. Tile floors consisting of rib-backed tiles.
 - e. Natural stone tiles
 - f. Tiles with one dimension greater than 15 inches
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.

- D. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
- F. **Joint width of 1/8 inch for thin set floor and wall applications shall be used** unless noted otherwise on the drawings.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces per TCNA F125.
- H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
- I. Metal Edge Strips: Install at locations indicated.
- J. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- K. Install tile backing panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- L. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.

3.4 EXTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Exterior Floor Installations:
 - 1. Ceramic Tile Installation: TCNA F101 and ANSI A108.1C; cement mortar bed (thickset) over waterproof membrane on concrete where indicated and bonded to concrete where membrane is not indicated.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Bond Coat for Cured-Bed Method: Improved modified dry-set mortar.
 - c. Grout: Standard sanded cement grout.
- B. Exterior Wall Installations, Masonry or Concrete:
 - 1. Ceramic Tile Installation: TCNA W202; thinset mortar over waterproof membrane.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: Standard sanded cement or unsanded cement grout.

C. Exterior Wall Installations, Wood or Metal Studs:

1. Ceramic Tile Installation: TCNA W244E; thinset mortar on cementitious backer units over vapor-retarder membrane.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: Standard sanded cement or unsanded cement grout.

3.5 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Tile Installation Restroom (full mortar bed applications): TCNA F114 and ANSI A108.1B; cement mortar bed (thickset) with cleavage membrane; epoxy grout.
 - a. Ceramic Tile Type: Large format or as indicated on the drawings.
 - b. Bond Coat for Cured-Bed Method: Improved Modified dry-set mortar.
 - c. Grout: Water-cleanable epoxy grout.
2. Ceramic Tile Installation Restrooms (thinset applications): TCNA F115; thinset mortar; epoxy grout.
 - a. Ceramic Tile Type: Large format or as indicated on the drawings.
 - b. Thinset Mortar: Improved Modified dry-set mortar.
 - c. Grout: Water-cleanable epoxy grout.
 - d. Crack isolation and decoupling membrane as indicated.
3. Ceramic Tile Installation Showroom: TCNA F125-Full, except where partial coverage is indicated; thinset mortar.
 - a. Ceramic Tile Type: Large format or as indicated on the drawings.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.
 - d. Crack isolation and decoupling membrane as indicated.
4. Ceramic Tile Installation Shop: TCNA F131; water-cleanable, tile-setting epoxy; epoxy grout.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Grout: Water-cleanable epoxy grout.
 - c. Crack isolation and decoupling membrane as indicated.
5. Ceramic Tile Installation Shop or Interior Service Drive: TCNA F132; water-cleanable, tile-setting epoxy on cured cement mortar bed; epoxy grout.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Grout: Water-cleanable epoxy grout.
 - c. Crack isolation and decoupling membrane as indicated.

B. Interior Wall Installations, Masonry or Concrete:

1. Ceramic Tile Installation in applicable areas: TCNA W202; thinset mortar.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

C. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation Restrooms: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: As indicated on the drawings.
 - b. Thinset Mortar: Modified dry-set mortar.
 - c. Grout: High-performance unsanded grout.

D. Shower Receptor and Wall Installations:

1. Ceramic Tile Installation: TCNA B415; thinset mortar on waterproof membrane over cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: As indicated on drawings.
 - b. Thinset Mortar: Improved modified dry-set mortar.
 - c. Grout: Water-cleanable epoxy grout.

END OF SECTION 09 3013

SECTION 09 5113

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
 - 1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Acoustical Panels
 - b. Metal Suspension System
 - c. Acoustical Sealant
 - 2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Acoustical Panels
 - b. Metal Suspension System
 - c. Acoustical Sealant
- C. Samples: For each exposed product and for each color and texture specified, 6 inches in size.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch-Samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch-long Samples of each type, finish, and color.
 - 3. Clips: Full-size hold-down, impact, and seismic clips.
- E. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 1. Ceiling suspension-system members.
 2. Structural members to which suspension systems will be attached.
 3. 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.
 4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
 5. Size and location of initial access modules for acoustical panels.
 6. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Speakers.
 - e. Sprinklers.
 - f. Access panels.
 - g. Perimeter moldings.
 7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
 8. Minimum Drawing Scale: 1/4 inch = 1 foot.
- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 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. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

3. Hold-Down Clips: Equal to 2 percent of quantity installed.
4. Impact Clips: Equal to 2 percent of quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design seismic restraints for ceiling systems.
- B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- C. 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: Class A, B or C according to ASTM E 1264.
 2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products as indicated on the drawings. If manufacturers or products are not listed, provide products by one of the following:
 1. American Gypsum.
 2. Armstrong World Industries, Inc.
 3. CertainTeed Corporation.
 4. Rockfon (Roxul Inc.).
 5. Tectum Inc.
 6. USG Corporation.
- B. Acoustical Panel Standard: Manufacturer's standard panels according to ASTM E 1264.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products as indicated on the drawings. If manufacturers or products are not listed, provide products by one of the following:
 1. Armstrong World Industries, Inc.
 2. CertainTeed Corporation.
 3. Rockfon

4. USG Corporation

B. Metal Suspension-System Standard: Manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635.

1. Suspension system shall be compatible with panel selected.
2. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C 635.

2.5 ACCESSORIES

A. 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.

B. Hold-Down Clips: Manufacturer's standard hold-down.

C. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

D. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

1. Touch up paint to match panel and grid units.
2. Acoustic sealant per 079005

2.6 METAL EDGE MOLDINGS AND TRIM

A. Manufacturers: Subject to compliance with requirements, provide products by same manufacturer selected for Acoustical Panels. If none selected, choose from one of the following:

1. Armstrong World Industries, Inc.
2. CertainTeed Corporation.
3. Fry Reglet Corporation
4. Rockfon
5. Gordon, Inc.
6. USG Corporation

B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 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.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. 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 unless otherwise indicated.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C 636, seismic design requirements, and manufacturer's written instructions.
 - 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 and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

6. Do not support ceilings directly 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.
 7. 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.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- 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 o.c. and not more than 3 inches from ends. 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 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. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 5. 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.
 6. Install hold-down, impact and seismic clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
 7. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.

8. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: See Section 01 4000 "Quality Requirements" for special inspection requirements and procurement and responsibility for inspector to perform inspections.
 1. Periodic inspection during the installation of suspended ceiling grids according to ASCE/SEI 7.

3.6 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.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 5113

SECTION 09 6513

RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermoset rubber base.
2. Vinyl base.
3. Rubber stair accessories and tile for landings.
4. Rubber molding accessories.
5. Vinyl molding accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

1.3 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. 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.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.5 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following periods:

1. 48 hours before installation.
2. During installation.

3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg for more than 95 deg F.
 - C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 2. Flexco.
 3. Johnsonite; a Tarkett company.
 4. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet or as indicated on the drawings.
 - b. Style B, Cove: Provide in areas with resilient floor coverings or as indicated on the drawings.
- C. Thickness: 0.125 inch.
- D. Height: 4 inches unless otherwise indicated on the drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Preformed.
- H. Colors: As indicated on the drawings and selected by manufacturer's full range.

2.2 VINYL BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Armstrong World Industries, Inc.
 2. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 3. Johnsonite; a Tarkett company.
 4. Roppe Corporation, USA.
- B. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).

1. Group: I (solid, homogeneous).
2. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet or as indicated on the drawings.
 - b. Style B, Cove: Provide in areas with resilient floor coverings or as indicated on the drawings.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches unless otherwise indicated on the drawings.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: preformed.
- G. Inside Corners: Preformed.
- H. Colors and Patterns: As indicated on the drawings and selected by manufacturer's full range.

2.3 RUBBER STAIR ACCESSORIES AND TILE FOR LANDINGS

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allstate Rubber Corp.
 - b. American Biltrite.
 - c. Armstrong World Industries, Inc.
 - d. Burke Mercer Flooring Products; a division of Burke Industries Inc.
 - e. Flexco.
 - f. Johnsonite; a Tarkett company.
 - g. Musson Rubber Co.
 - h. R.C.A. Rubber Company (The).
 - i. Roppe Corporation, USA.
- B. Stair Treads: ASTM F 2169.
 1. Type: TS (rubber, vulcanized thermoset).
 2. Basis of Design:
 - a. Roppe #94 with abrasive strip.
 3. Size: Lengths and depths to fit each stair tread in one piece or, for treads exceeding maximum lengths manufactured, in equal-length units. Color as indicated on drawings.
- C. Separate Risers: Smooth, flat; in height that fully covers substrate; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- D. Rubber Floor Tile for Landings:

1. Tile Standard: ASTM F 1344, Class I-A, Homogeneous Rubber Tile, solid color.
2. Basis of Design: Roppe #994 Pattern
3. Size: 12 by 12 inches unless otherwise indicated on the drawings.
4. Colors: As indicated on the drawings.

2.4 RUBBER MOLDING ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Roppe Corporation, USA.
- B. Description: Nosings, reducer strips, carpet edge or other accessory if indicated on the drawings.
- C. Profile and Dimensions: As indicated on drawings.
- D. Locations: Provide rubber molding accessories in areas indicated.

2.5 VINYL MOLDING ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Same Manufacturer as selected for vinyl base.
- B. Description: Nosings, reducer strips, carpet edge or other accessory if indicated on the drawings.
- C. Profile and Dimensions: As indicated on drawings.
- D. Locations: Provide vinyl molding accessories in areas indicated.

2.6 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Stair-Tread Nose Filler: Two-part epoxy compound recommended by resilient stair-tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces 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 substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.

- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners: Not permitted.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from resilient stair treads before applying liquid floor polish.
 - 1. Apply two coats.

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- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 09 6513

SECTION 09 6519
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Rubber floor tile.
 - 2. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, 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 RUBBER FLOOR TILE

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burke Flooring
 - b. Flexco.
 - c. Johnsonite; a Tarkett company.
 - d. Roppe
- B. Tile Standard: ASTM F 1344, Class I-A, Homogeneous Rubber Tile, solid color.
- C. Hardness: Grade 2, minimum hardness of 70, measured using Shore, Type A durometer according to ASTM D 2240.
- D. Wearing Surface: As indicated on drawings.

- E. Thickness: 0.125 inch.
- F. Size: 12 by 12 inches unless otherwise indicated on the drawings.
- G. Colors and Patterns: As indicated on the drawings.

2.3 VINYL COMPOSITION FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. Johnsonite; a Tarkett company.
 - 3. American Tile, Inc.
- B. Tile Standard: ASTM F 1066, Class 1, solid color.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: unless otherwise noted on the drawings.
- F. Colors and Patterns: As indicated on the drawings.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated. LEED Only
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated on drawings.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coats.
- E. Cover floor tile until Substantial Completion.

END OF SECTION 09 6519

SECTION 09 6523
LUXURY VINYL TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Luxury Vinyl Tile.
 - 2. Acoustical underlayment.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and pattern specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

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. Luxury Vinyl Tile: Furnish one box for every 30 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.8 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, 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 LUXURY VINYL TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JJ Flooring
 - b. LSI Floors.
 - c. Tandus, Tarkett
 - d. Shaw Contract
 - e. Mohawk
 - f. Interface
- B. Wearing Surface: As indicated on drawings.
- C. Thickness: 5mm.

- D. Size: as indicated on the drawings.
- E. Colors and Patterns: As indicated on the drawings.

2.3 ACOUSTICAL UNDERLAYMENT

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JJ Flooring
 - b. Tandus, Tarkett
 - c. Shaw Contract
 - d. Mohawk
 - e. Interface
- B. Model: SoundCheck SC100
- C. Material: Polyurethane Foam
- D. Thickness: 0.055 inches.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated. LEED Only

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay tiles in pattern indicated on drawings.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Substantial Completion.

END OF SECTION 09 6523

SECTION 09 6536

STATIC-CONTROL RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Static-dissipative flooring and accessories as shown on the drawings and schedules and as indicated by the requirements of this section.

B. Related Requirements:

1. Section 09 6513 "Resilient Base and Accessories" for resilient base, reducer strips, transition strips and other accessories installed with static-control resilient flooring.

1.2 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.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of static-control resilient flooring. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

1. Show details of special patterns.
2. Show locations of inscribed maintenance tiles.
3. Submit grounding diagram showing location of grounding strips and connections.

C. Samples for Verification: For each type of static-control resilient flooring, of size indicated below:

1. Floor Tile: 6-by-9-inch units.

1.4 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.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of static-control resilient flooring 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for static-control resilient flooring.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store static-control resilient flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer but not less than 50 deg F or more than 90 deg F.
 - 1. Floor Tile: Store on flat surfaces.

1.9 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive static-control resilient flooring during the following time periods:
 - 1. During installation.

2. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during static-control resilient flooring installation.
- D. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Static-Dissipative, Vinyl Composition Floor Tile: ASTM F1066 (vinyl composition floor tile, nonasbestos formulated), Class 2 (through-pattern tile).
 1. Basis-of-Design Product: Subject to compliance with requirements, provide the following product or comparable product by an approved manufacturer:
 - a. Armstrong Flooring, Inc.; SDT Static Dissapative Tile Flooring.
 2. Thickness: Not less than 0.125 inch.
 3. Size: 12 by 12 inches.
 4. Colors and Patterns: As selected by Architect from Manufacturer's full range of product colors.

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.
- 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 present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion or static-control characteristics of floor coverings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of static-control resilient flooring and electrical continuity of floor-covering systems. Do not install Static Dissipative Floor Tile until substrate conditions meet the manufacturer's requirements for installation.
- B. Concrete Substrates: Prepare according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with 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.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install static-control resilient flooring until it is same temperature as space where it is to be installed.
 - 1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

3.3 INSTALLATION, GENERAL

- A. Install static-control resilient flooring according to manufacturer's written instructions.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.
- C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install static-control resilient flooring on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of static-control resilient flooring installed on covers. Tightly adhere static-control resilient flooring edges to substrates that abut covers and to cover perimeters.
- G. Adhere static-control resilient flooring to substrates using a full spread of static-control adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 FLOOR-TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
 - 1. Lay floor tiles in pattern indicated on drawings.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 - 1. Lay static-dissipative, vinyl composition floor tiles with grain direction alternating in adjacent floor tiles (basket-weave pattern) unless notes otherwise on the drawings.
- D. In each space where conductive, solid vinyl floor tile is installed, install maintenance floor tile identifying conductive floor tile in locations approved by Architect.

3.5 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 marks, 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 09 6536

SECTION 09 6813

TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes:
 - 1. Modular carpet tile.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For carpet tile installation, plans showing the following:
 - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.
 - 3. Type of subfloor.
 - 4. Type of installation.
 - 5. Pattern of installation.
 - 6. Pattern type, location, and direction.
 - 7. Pile direction.
 - 8. Type, color, and location of insets and borders.
 - 9. Type, color, and location of edge, transition, and other accessory strips.
 - 10. Transition details to other flooring materials.
- C. Samples: For each exposed product and for each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports. For carpet tile, for tests performed by a qualified testing agency.
- B. Sample warranty: for Special Warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

- B. Attic Stock: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.7 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

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

- a. Atlas Carpet Mills, Inc.
- b. Beaulieu Group LLC.
- c. Bentley Prince Street, Inc.
- d. Interface, LLC.
- e. J&J Invision; J&J Industries, Inc.
- f. Mannington Mills, Inc.
- g. Milliken & Company.
- h. Mohawk Group (The); Mohawk Carpet, LLC.
- i. Patcraft; a division of Shaw Industries, Inc.
- j. Philadelphia Commercial; a division of Shaw Industries, Inc.
- k. Shaw Contract Group; a Berkshire Hathaway company.
- l. Tandus; a Tarkett company.

- B. Color: As indicated on drawings.
- C. Pattern: As indicated in drawings.
- D. Primary Backing/Backcoating: Per manufacturer's Recommendations
- E. Size: As indicated on drawings.
- F. Applied Treatments:
 - 1. Soil-Resistance Treatment: Manufacturer's standard treatment.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
 - 1. Provide Leveling Compound in high transition areas to maintain flush top surface from Tile Carpeting to adjacent flooring material. Compound to be installed in wedge section or transition underneath Tile Carpeting.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 3000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.
- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- C. Metal Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- D. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes, and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Metal Substrates: Clean grease, oil, soil, and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
- E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
 - 1. Fully adhere carpet tile to substrate.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders unless otherwise indicated on drawings.
- I. 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 09 6813

SECTION 09 6816

SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tufted carpet.
2. Woven carpet.
3. Carpet cushion.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For carpet installation, showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
2. Carpet type, color, and dye lot.
3. Locations where dye lot changes occur.
4. Seam locations, types, and methods.
5. Type of subfloor.
6. Type of installation.
7. Pattern type, repeat size, location, direction, and starting point.
8. Types, colors, and locations of insets and borders.
9. Types, colors, and locations of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.
11. Type of carpet cushion.

- C. Samples: For each exposed product and for each color and texture required.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For carpet and carpet cushion, for tests performed by a qualified testing agency.

- C. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Carpet: Full width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

1.8 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty for Carpet Cushion: Manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Carpet Mills, Inc.
 - b. Beaulieu Group LLC.
 - c. Bentley Prince Street, Inc.
 - d. Couristan, Inc.

- e. Fortune Contract, Inc.
- f. Interface, LLC.
- g. J&J Invision; J&J Industries, Inc.
- h. Mannington Mills, Inc.
- i. Masland Contract; Dixie Group, Inc. (The).
- j. Milliken & Company.
- k. Mohawk Group (The); Mohawk Carpet, LLC.
- l. Patcraft; a division of Shaw Industries, Inc.
- m. Philadelphia Commercial; a division of Shaw Industries, Inc.
- n. Shaw Contract Group; a Berkshire Hathaway company.
- o. Tandus; a Tarkett company.

B. Color: As indicated on drawings.

C. Pattern: As indicated on drawings.

D. Primary Backing: Manufacturer's standard material.

E. Roll Width: 12 feet unless otherwise indicated.

F. Applied Treatments:

- 1. Applied Soil-Resistance Treatment: Manufacturer's standard material.

2.2 WOVEN CARPET

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

- 1. Axminster Carpets Ltd.
- 2. Bentley Prince Street, Inc.
- 3. Couristan, Inc.
- 4. Masland Contract; Dixie Group, Inc. (The).
- 5. Mohawk Group (The); Mohawk Carpet, LLC.
- 6. Prestige Mills, Inc.
- 7. Stanton Carpet Corporation.
- 8. Tandus; a Tarkett company.

B. Color: As indicated on drawings.

C. Pattern: As indicated on drawings.

D. Backing: Manufacturer's standard.

E. Applied Treatments:

- 1. Applied Soil-Resistance Treatment: Manufacturer's standard material.

2.3 CARPET CUSHION

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Carpenter Co.
 - b. Dalton Foam; a division of NCFI Polyurethanes; a division of Barnhardt Manufacturing Company.
 - c. Dura Undercushions Ltd.
 - d. Foam Products Corporation.
 - e. Hickory Springs Manufacturing Company, Inc.
 - f. Los Angeles Fiber.
 - g. Scottdel Cushion LLC.
 - h. Sponge Cushion, Inc.; A Leggett & Platt company.
 - i. TredMOR by SCI; Leggett & Platt, Inc.
- B. Traffic Classification: CCC Class I, moderate traffic.
- C. Polyurethane-Foam Cushion: As recommended by carpet manufacturer.

2.4 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet and cushion manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
- C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive, carpet cushion, and carpet manufacturers. Proceed with installation only after substrates pass testing.
- B. Wood Subfloors: Verify that underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard" and with carpet manufacturer's written installation instructions for preparing substrates.
- B. 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 wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive, carpet, and carpet cushion manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 CARPET INSTALLATION

- A. Comply with CRI's "CRI Carpet Installation Standard" and carpet and carpet cushion manufacturers' written installation instructions for the following:
 - 1. Direct-glue-down installation.
 - 2. Double-glue-down installation.
 - 3. Carpet with attached-cushion installation.
 - 4. Stair installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Install borders with mitered corner seams.
- D. Do not bridge building expansion joints with carpet.
- E. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet cushion and adhesive manufacturers.

SECTION 09 9000

PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following substrates:
1. Concrete.
 2. Cement board and fiber cement board.
 3. Clay masonry.
 4. Concrete masonry units (CMUs).
 5. Steel and iron.
 6. Galvanized metal.
 7. Aluminum (not anodized or otherwise coated).
 8. Wood.
 9. Fiberglass.
 10. Plastic.
 11. Gypsum board.
 12. Plaster.

1.2 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 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 including MPI Product Number.
 2. Indicate VOC content.
- B. Sustainable Design Submittals:
1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Paint.
 2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Paint.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
1. Submit Samples on rigid backing, 8 inches square.
 2. 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.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.
- 1.4 MAINTENANCE MATERIAL SUBMITTALS
- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than of each material and color applied.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.
- 1.6 FIELD CONDITIONS
- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Duron, Inc.
 - 4. Glidden Professional.
 - 5. PPG Paints.
 - 6. Sherwin-Williams Company (The).
 - 7. Valspar Corporation - Architectural (Pro).
- B. Products: Subject to compliance with requirements, provide product listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. Colors: As indicated on the drawings.

2.3 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Fiber-Cement Board: 12 percent.
 - 3. Masonry (Clay and CMUs): 12 percent.
 - 4. Wood: 15 percent.
 - 5. Gypsum Board: 12 percent.
 - 6. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 3.
 - 3. SSPC-SP 7/NACE No. 4.
 - 4. SSPC-SP 11.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms (unless indicated otherwise):
 - a. Equipment, including panelboards and switch gear without factory applied finish.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.
 - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces or exterior to the building (unless indicated otherwise):
 - a. Equipment, including panelboards.
 - b. Uninsulated metal piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - h. Other items as directed by Architect.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.

2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 PAINTING SCHEDULE

- A. Painting Schedule provided in separate Specification Section.

END OF SECTION 09 9000

SECTION 10 2114

STAINLESS-STEEL TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes stainless-steel toilet compartments configured as toilet enclosures and urinal screens.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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 reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
 - 5. Show locations of floor drains.
- C. Samples for each type of toilet compartment material indicated.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates. For each type of toilet compartment.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data. For toilet compartments 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. Door Hinges: One hinge(s) with associated fasteners.
 - 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
 - 3. Door Bumper: One door bumper(s) with associated fasteners.
 - 4. Door Pull: One door pull(s) with associated fasteners.
 - 5. Fasteners: Ten fasteners of each size and type.

1.6 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. 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 STAINLESS-STEEL TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Accurate Partitions Corp.; ASI Group.
 - 2. AJW Architectural Products.
 - 3. All American Metal Corp.
 - 4. American Sanitary Partition Corporation.
 - 5. Ampco Products, LLC.
 - 6. Bradley Corporation.
 - 7. Flush Metal Partition, LLC.
 - 8. General Partitions Mfg. Corp.
 - 9. Global Partitions; ASI Group.
 - 10. Hadrian Manufacturing Inc.
 - 11. Knickerbocker Partition Corporation.
 - 12. Marlite.
 - 13. Metpar Corp.
 - 14. Shanahan's Manufacturing Limited.
- B. Toilet-Enclosure Style: Overhead braced, floor anchored.
- C. Urinal-Screen Style: Wall hung flat panel.
- D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.

2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units of size and material adequate for panel to withstand applied downward load on grab bar of at least 250 lbf, when tested according to ASTM F 446, without deformation of panel.
3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Urinal-Screen Construction:

1. Flat-Panel Urinal Screen: Matching panel construction.

F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:

1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch.
2. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.050 inch.
3. Panels: Manufacturer's standard thickness, but not less than 0.031 inch.
4. Doors: Manufacturer's standard thickness, but not less than 0.031 inch.
5. Flat-Panel Urinal Screens: Thickness matching the panels.

G. Pilaster Shoes: Stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.

H. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel

I. Stainless-Steel Finish: No. 4 bright, directional polish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's standard stainless-steel 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, 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 anti-grip 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 FABRICATION

- A. **See drawings for Toilet Partition dimensions including partition heights.**
- B. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- C. 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.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch-wide in-swinging doors for standard toilet compartments and 36-inch-wide out-swinging doors with a minimum 32-inch-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. 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.

3.2 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.

DHS OF ROCKDALE COUNTY
CONYERS, GA
PRAXIS3-23122

10 2114-5
STAINLESS-STEEL TOILET COMPARTMENTS
FEBRUARY 23, 2024

END OF SECTION 10 2114

SECTION 10 2600
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Corner guards.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
2. Include fire ratings of units recessed in fire-rated walls and listings for door-protection items attached to fire-rated doors.

B. Shop Drawings: For each type of wall protection showing locations and extent.

1. Include plans, elevations, sections, and attachment details.

C. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

1. Corner Guards: 12 inches long. Include examples of top caps.

1.3 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of wall and door protection product 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. Corner-Guard Covers: Full-size plastic covers of maximum length equal to 2 percent of each type, color, and texture of cover installed, but no fewer than two, 48-inch-long units.

2. Mounting and Accessory Components: Amounts proportional to the quantities of extra materials. Package mounting and accessory components with each extra material.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-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 including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall-protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 450 or less.

2.3 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards: Fabricated as one piece from formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Babcock-Davis.
 - b. Construction Specialties, Inc.
 - c. Nystrom, Inc.
 2. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0500 inch.
 - b. Finish: Directional satin, No. 4.

3. Wing Size: Nominal 1-1/2 by 1-1/2 inches.
4. Corner Radius: 1/8 inch.
5. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes.

2.4 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install corner protection according to manufacturer's written instructions, level, plumb, and true to line without distortions.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 2. Adjust top caps as required to ensure tight seams.

END OF SECTION 10 2600

SECTION 10 2800

TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Private-use bathroom accessories.
3. Warm-air dryers.
4. Childcare accessories.
5. Custodial accessories.

B. Related Requirements:

1. Section 08 8300 "Mirrors" for frameless mirrors.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: Finish samples for each exposed product and for each finish specified.

1.3 INFORMATIONAL SUBMITTALS

A. Sample warranty: For manufacturer's special warranties.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance data: For accessories to include in maintenance manuals.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.
- B. Toilet Tissue (Roll) Dispenser: As scheduled on drawings.

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

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Brey-Krause Manufacturing Co.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Tubular Specialties Manufacturing, Inc.

- C. Paper Towel (Folded) Dispenser: As indicated on drawings.

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

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Brey-Krause Manufacturing Co.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Seachrome Corporation.
- h. Tubular Specialties Manufacturing, Inc.

- D. Paper Towel (Roll) Dispenser: As scheduled on drawings.

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

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Brey-Krause Manufacturing Co.

- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Seachrome Corporation.
- h. Tubular Specialties Manufacturing, Inc.

E. Automatic Paper Towel (Roll) Dispenser: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. GAMCO Specialty Accessories; a division of Bobrick.

F. Waste Receptacle: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.

G. Combination Towel (Folded) Dispenser/Waste Receptacle: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Seachrome Corporation.
 - h. Tubular Specialties Manufacturing, Inc.

H. Combination Towel (Roll) Dispenser/Waste Receptacle: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.

- d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Seachrome Corporation.
 - h. Tubular Specialties Manufacturing, Inc.
- I. Liquid-Soap Dispenser: As scheduled on drawings.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Seachrome Corporation.
 - h. Tubular Specialties Manufacturing, Inc.
- J. Automatic Liquid-Soap Dispenser: As scheduled on drawings.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bradley Corporation.
 - d. GAMCO Specialty Accessories; a division of Bobrick.
 - e. Sloan Valve Company.
 - f. Stern Engineering Ltd.
 - g. Bobrick Washroom Equipment, Inc.
- K. Grab Bar: As scheduled on drawings.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
- L. Sanitary-Napkin Disposal Unit: As scheduled on drawings.
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.

- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Brey-Krause Manufacturing Co.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Seachrome Corporation.
- h. Tubular Specialties Manufacturing, Inc.

M. Seat-Cover Dispenser: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Seachrome Corporation.
 - h. Tubular Specialties Manufacturing, Inc.

N. Mirror Unit: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.

O. Coat Hook: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.

2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

- A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.
- B. Shower Curtain Rod: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
- C. Folding Shower Seat: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
- D. Robe Hook: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.

2.4 PRIVATE-USE BATHROOM ACCESSORIES

- A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.
- B. Toilet Tissue Dispenser: As scheduled on drawings.

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

- a. American Specialties, Inc.
- b. Basco, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Ginger by Brasstech, Inc.; a Masco company.
- h. Seachrome Corporation.
- i. Tubular Specialties Manufacturing, Inc.

C. Shower Curtain Rod: As scheduled on drawings.

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

- a. American Specialties, Inc.
- b. Basco, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- e. GAMCO Specialty Accessories; a division of Bobrick.
- f. Ginger by Brasstech, Inc.; a Masco company.
- g. Seachrome Corporation.
- h. Tubular Specialties Manufacturing, Inc.

D. Soap Dish: As scheduled on drawings.

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

- a. American Specialties, Inc.
- b. Basco, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- e. GAMCO Specialty Accessories; a division of Bobrick.
- f. Ginger by Brasstech, Inc.; a Masco company.
- g. Seachrome Corporation.
- h. Tubular Specialties Manufacturing, Inc.

E. Medicine Cabinet: As scheduled on drawings.

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

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Basco, Inc.
- d. Bobrick Washroom Equipment, Inc.
- e. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Ginger by Brasstech, Inc.; a Masco company.

- h. Seachrome Corporation.
- i. Tubular Specialties Manufacturing, Inc.

F. Robe Hook: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. American Specialties, Inc.
 - b. Basco, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
 - e. GAMCO Specialty Accessories; a division of Bobrick.
 - f. Ginger by Brasstech, Inc.; a Masco company.
 - g. Seachrome Corporation.

G. Toothbrush and Tumbler Holder: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Basco, Inc.
 - d. Bobrick Washroom Equipment, Inc.
 - e. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Ginger by Brasstech, Inc.; a Masco company.
 - h. Seachrome Corporation.
 - i. Tubular Specialties Manufacturing, Inc.

H. Towel Bar: As scheduled on drawings.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Basco, Inc.
 - d. Bobrick Washroom Equipment, Inc.
 - e. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Ginger by Brasstech, Inc.; a Masco company.
 - h. Seachrome Corporation.
 - i. Tubular Specialties Manufacturing, Inc.

I. Towel Shelf: As scheduled on drawings.

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

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Basco, Inc.
- d. Bobrick Washroom Equipment, Inc.
- e. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Ginger by Brasstech, Inc.; a Masco company.
- h. Seachrome Corporation.
- i. Tubular Specialties Manufacturing, Inc.

J. Towel Rack: As scheduled on drawings.

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

- a. Basco, Inc.
- b. Bobrick Washroom Equipment, Inc.
- c. Franklin Brass by Liberty Hardware Manufacturing Corporation; a Masco company.
- d. GAMCO Specialty Accessories; a division of Bobrick.
- e. Ginger by Brasstech, Inc.; a Masco company.
- f. Seachrome Corporation.
- g. Taymore Industries USA Inc.
- h. Tubular Specialties Manufacturing, Inc.

2.5 WARM-AIR DRYERS

A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.

B. Warm-Air Dryer: As scheduled on drawings.

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

- a. AJW Architectural Products.
- b. American Dryer, Inc.
- c. American Specialties, Inc.
- d. Bobrick Washroom Equipment, Inc.
- e. Bradley Corporation.
- f. Excel Dryer Inc.
- g. GAMCO Specialty Accessories; a division of Bobrick.
- h. Saniflow Hand Dryer Corporation.
- i. Sloan Valve Company.
- j. Tubular Specialties Manufacturing, Inc.

C. High-Speed Warm-Air Dryer: As scheduled on drawings.

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

- a. AJW Architectural Products.

- b. American Dryer, Inc.
- c. American Specialties, Inc.
- d. Bradley Corporation.
- e. Excel Dryer Inc.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Saniflow Hand Dryer Corporation.
- h. Sloan Valve Company.
- i. World Dryer Corporation.

2.6 CHILDCARE ACCESSORIES

- A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.
- B. Diaper-Changing Station: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Specialties, Inc.
 - b. Diaper Deck & Company, Inc.
 - c. Foundations Children's Products.
 - d. GAMCO Specialty Accessories; a division of Bobrick.
 - e. Koala Kare Products.
 - f. SafeStrap Company, Inc. (SSC, Inc.).
 - g. Tubular Specialties Manufacturing, Inc.

2.7 CUSTODIAL ACCESSORIES

- A. Basis of Design Product is as scheduled on the drawings. The following accessories may be considered upon following the substitution procedures outlined in Section 01 2500 Substitution Procedures prior to bidding.
- B. Utility Shelf: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
- C. Mop and Broom Holder: As scheduled on drawings.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. AJW Architectural Products.
- b. American Specialties, Inc.
- c. Bobrick Washroom Equipment, Inc.
- d. Bradley Corporation.
- e. Brey-Krause Manufacturing Co.
- f. GAMCO Specialty Accessories; a division of Bobrick.
- g. Tubular Specialties Manufacturing, Inc.

2.8 FABRICATION

- A. 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. Grab Bars: Install to withstand a downward load of at least 250 lbf., when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

END OF SECTION 10 2800

SECTION 10 4413
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 4416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each type of exposed finish required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data: For fire-protection cabinets to include in maintenance manuals.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING

- A. Apply decals or vinyl lettering on field-painted fire-protection cabinets after painting is complete.
- B. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Larsens Manufacturing Company
 - b. Nystrom, Inc.
 - c. Potter Roemer LLC.
- B. Cabinet Construction: Nonrated, one-hour fire rated, or two-hour fire rated as required or indicated.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet
- D. Recessed Cabinet:
 - 1. Provide a fully recessed cabinet where depth of framing allows at each location.
 - 2. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
- E. Semi-recessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 - 1. Provide semi-recessed cabinet where depth of framing does not allow a fully recessed cabinet at each location.
 - 2. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.
- F. Cabinet Trim Material: Steel sheet.
- G. Door Material: Steel sheet.
- H. Door Style: Vertical duo panel with frame.
- I. Door Glazing: Clear float glass.
- J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
- K. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER".
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: White.
 - 4) Orientation: Vertical.

L. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
 - b. Color: As selected by Architect from manufacturer's full range of industry colors and color densities.
2. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
3. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick.

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for recessed and semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply decals or vinyl lettering at locations indicated.

- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

3.2 SCHEDULES

- A. Provide recessed or semi-recessed cabinets w/extinguisher at finished steel stud framed walls as indicated above.
- B. Provide surface mounted cabinets w/extinguishers at finished spaces with CMU walls.
- C. Provide bracket mounted extinguishers at Parts, Shop, Storage, Electrical, and other utility spaces as indicated on drawings.

END OF SECTION 10 4413

SECTION 10 4416
FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 104413 "Fire Protection Cabinets."

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International.
 - c. Babcock-Davis.
 - d. Badger Fire Protection.
 - e. Buckeye Fire Equipment Company.
 - f. Fire End & Croker Corporation.
 - g. Guardian Fire Equipment, Inc.
 - h. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - i. Kidde Residential and Commercial Division.
 - j. Larsens Manufacturing Company.
 - k. MOON American.
 - l. Nystrom, Inc.
 - m. Oval Fire Products Corporation.
 - n. Potter Roemer LLC.
 - o. Pyro-Chem; Tyco Fire Suppression & Building Products.
 - p. Strike First Corporation of America (The).
 - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Multipurpose Dry-Chemical Type: UL-rated 10 pound nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- C. For kitchen installations, and where indicated on the drawings, Class K type, UL rated 10 pound nominal capacity.

2.3 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 black baked-enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International.
 - c. Babcock-Davis.
 - d. Badger Fire Protection.
 - e. Buckeye Fire Equipment Company.
 - f. Fire End & Croker Corporation.
 - g. Guardian Fire Equipment, Inc.
 - h. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - i. Kidde Residential and Commercial Division.
 - j. Larsens Manufacturing Company.
 - k. Nystrom, Inc.
 - l. Potter Roemer LLC.
 - m. Pyro-Chem; Tyco Fire Suppression & Building Products.
 - n. Strike First Corporation of America (The).
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
1. Mounting Brackets: Top of fire extinguisher to be at 54 inches above finished floor.
- C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 4416

SECTION 11 3013
RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cooking appliances.
 - 2. Refrigeration appliances.
 - 3. Cleaning appliances.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Energy Efficiency Submittals:
 - 1. Provide Manufacturer data sheets for appliances confirming Energy Star compliance.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates: For each type of appliance.
- B. Sample warranties: For manufacturers' special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
 - a. Provide five year manufacturer warranty on refrigeration systems of refrigerator/freezers and refrigerators.
 - b. Provide five year manufacturer warranty on refrigeration systems of icemakers.
 - c. Provide ten year manufacturer warranty on magnetron of microwave ovens.
 - d. Provide ten year manufacturer warranty on tub and door liner of dishwashers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design, ICC A117.1, and the specific accessibility requirements of the jurisdiction in which the project is located.

2.2 REFRIGERATOR/FREEZERS

- A. Refrigerator/Freezer 1: Two-door, side-by-side refrigerator/freezer and complying with AHAM HRF-1.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amana; a division of Whirlpool Corporation.
 - b. General Electric Company (GE Appliances).
 - c. KitchenAid; a division of Whirlpool Corporation.
 - d. Whirlpool Corporation.
 - 2. Type: Freestanding.
 - 3. Storage Capacity:
 - a. Refrigeration Compartment Volume: Minimum 25 cu. ft. capacity.
 - b. Freezer Volume: Minimum 15% of total unit value.
 - 4. General Features:
 - a. Dispenser in door for ice and water.
 - b. Interior light in refrigeration compartment.
 - c. Automatic defrost.
 - d. Interior light in freezer compartment.
 - e. Automatic icemaker and storage bin.
 - 5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
 - 6. Front Panel(s): Stainless steel unless otherwise indicated on drawings or schedule.

- B. Refrigerator/Freezer 2: Two-door, side-by-side refrigerator/freezer and complying with AHAM HRF-1.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amana; a division of Whirlpool Corporation.
 - b. General Electric Company (GE Appliances).
 - c. KitchenAid; a division of Whirlpool Corporation.
 - d. Whirlpool Corporation.
 2. Type: Freestanding.
 3. Storage Capacity:
 - a. Refrigeration Compartment Volume: Minimum 18 cu. ft. capacity.
 - b. Freezer Volume: Minimum 15% of total unit value.
 4. General Features:
 - a. Interior light in refrigeration compartment.
 - b. Automatic defrost.
 - c. Interior light in freezer compartment.
 - d. Automatic icemaker and storage bin.
 5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
 6. Front Panel(s): Front Panel(s): Stainless steel unless otherwise indicated on drawings or schedule.

2.3 UNDER-COUNTER REFRIGERATORS

- A. Refrigerator: Built-in, under counter, frost-free.
1. Similar to Summit Appliance, SCR600BGLBIADA.
 2. Type: Under counter
 3. Storage Capacity
 - a. Refrigeration Compartment Volume: 5.5 cu.ft
 4. General Features:
 - a. Interior light in refrigeration compartment.
 5. ENERGY STAR: Provide appliances that qualify for EPA/DOE ENERGY STAR product labeling program.
 6. Front Panel(s): Stainless steel unless otherwise indicated on drawings or schedule.

2.4 ICEMAKERS

- A. Icemaker: Automatic, compact.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. General Electric Company (GE Appliances).
 - b. KitchenAid; a division of Whirlpool Corporation
 - c. Whirlpool Corporation
 2. Ice Capacity:
 - a. Production: 45 lb. per day
 - b. Storage: 35lb (153.9kg).
 3. Features:
 - a. Water Filter
 - b. Automatic Shutoff
 4. Front Panel: Stainless steel unless otherwise indicated on drawings or schedule.

2.5 DISHWASHERS

A. Dishwasher: Under counter, complying with AHAM DW-1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Amana; a division of Whirlpool Corporation.
 - b. General Electric Company (GE Appliances).
 - c. KitchenAid; a division of Whirlpool Corporation.
 - d. Whirlpool Corporation.
2. Controls: Solid state electronic.
3. Cycles: Four, including normal.
4. Type: Built-in under counter.
5. ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product-labeling program.
6. Front Panel: Stainless steel unless otherwise indicated on drawings or schedule.

2.6 MICROWAVE OVENS

A. Microwave Oven: Countertop Type

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. General Electric Company (GE Appliances).
 - b. KitchenAid; a division of Whirlpool Corporation
 - c. Whirlpool Corporation
2. Type: Countertop.
3. Capacity: 2.0 Cubic Feet
4. Power: 1,000 watts
5. Features: Include turntable and sensor cooking controls
6. Front Panel: Stainless steel unless otherwise indicated on drawings or schedule.

B. Microwave Oven: Under Cabinet Type

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. General Electric Company (GE Appliances).
 - b. KitchenAid; a division of Whirlpool Corporation
 - c. Whirlpool Corporation
2. Type: Under Cabinet
3. Capacity: 1.6 cubic feet
4. Power: 1,000 watts
5. Features include turntable and 10 power levels.
6. Front Panel: Stainless steel unless otherwise indicated on drawings or schedule.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections.
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 11 3013

SECTION 11 3014
RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Cooking appliances.
 - 2. Refrigeration appliances.
 - 3. Cleaning appliances.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include installation details, material descriptions, dimensions of individual components, and finishes for each appliance.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Energy Efficiency Submittals:
 - 1. Provide Manufacturer data sheets for appliances confirming Energy Star compliance.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates: For each type of appliance.
- B. Sample warranties: For manufacturers' special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.6 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
 - a. Provide five year manufacturer warranty on coffee makers.
 - b. Provide five year manufacturer warranty on refrigeration systems of refrigerator/freezers and refrigerators.
 - c. Provide five year manufacturer warranty on refrigeration systems of icemakers.
 - d. Provide ten year manufacturer warranty on magnetron of microwave ovens.
 - e. Provide ten year manufacturer warranty on tub and door liner of dishwashers.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design, ICC A117.1, and the specific accessibility requirements of the jurisdiction in which the project is located.

2.2 APPLIANCE

- A. Coffee Maker (Owner supplied, Contractor installed).
 - 1. Starbucks Digital Interactive Cup Brewer with ADA Option.
 - a. Trash chute cutout required in millwork top.
 - b. 120v, 60hz, 12 amps.
 - c. Features three 2 lb. hoppers.
 - d. Dedicated plumbed water line and filtration required.
- B. Undercounter Refrigerator.
 - 1. Marvel ADA Under Counter Glass Door Refrigerator, Model, MA24BCG1:
 - a. Black with glass and stainless steel door.
 - b. Capacity; 4.9 cubic feet.
 - c. 32 inch height.
 - d. Adjustable black shelves.
 - e. Factory installed lock for security.
- C. Icemaker.
 - 1. Summit ADA Icemaker, Model, BIM44GADA:

- a. Stainless Steel, NSF certified.
- b. 25 lbs. storage capacity, 50 lbs. daily production.
- c. Automatic Defrost, clear cube ice.
- d. Front ventilation.
- e. Optional pump (for use where a drain is not provided).

D. Microwave Oven 1.

1. GE Over-the-range Microwave Oven, Model JNM3163RJSS:
 - a. Capacity; 1.6 cubic feet.
 - b. Power levels; 10.
 - c. Kitchen timer.
 - d. Turntable – 1000 watts.
 - e. Stainless Steel.

E. Microwave oven 2.

1. GE Countertop Microwave Oven, Model, JES2051SNSS:
 - a. Capacity 2.0 cubic feet.
 - b. Sensor cooking controls, automatically adjusts time and power.
 - c. Extra-large 16 inch turntable.
 - d. One touch instant operation.

F. Dishwasher.

1. Bosch ADA compliant dishwasher, Model, SGE53U55UC:
 - a. Full console dishwasher.
 - b. 4 wash cycles.
 - c. Energy Star qualified.
 - d. Stainless steel.

G. Refrigerator 1.

1. Whirlpool Side-by-Side Refrigerator, Model, WRS325SDHZ:
 - a. Stainless Steel.
 - b. Capacity; 24.55 cubic feet.
 - c. Fresh food capacity 15.44 cubic feet.
 - d. Freezer capacity 9.11 cubic feet.
 - e. Ice and water dispenser in door.
 - f. LED interior lighting

H. Refrigerator 2.

1. GE Top Freezer Refrigerator, Model, GIE18GSHSS:
 - a. Stainless Steel.
 - b. Capacity; 17.5 cubic feet.
 - c. Fresh food capacity 13.51 cubic feet.
 - d. Freezer capacity 4.01 cubic feet.
 - e. Snack drawer.
 - f. Gallon door storage.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
- C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections.
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 11 3014

SECTION 12 3623

PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic-laminate-clad countertops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
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: For plastic-laminate-clad countertops.
1. Include plans, sections, details, and attachments to other work. Detail fabrication and installation, including field joints.
 2. Show locations and sizes of cutouts and holes for items installed in plastic-laminate-clad countertops.
 3. Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples: Plastic laminates in each type, color, pattern, and surface finish required in manufacturer's standard size.
- D. Samples for Verification: As follows:
1. Plastic Laminates: For each type, color, pattern, and surface finish required, 8 by 10 inches in size.
 2. Wood-Grain Plastic Laminates: For each type, color, pattern, and surface finish required, 12 by 24 inches in size.
 3. Fabrication Sample: For each type and profile of countertop required, provide one sample applied to core material with specified edge material applied to one edge.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and fabricator.
- B. Product Certificates: For the following:
1. Composite wood and agrifiber products.
 2. High-pressure decorative laminate.
 3. Chemical-resistant, high-pressure decorative laminate.
 4. Adhesives.

- C. Quality Standard Compliance Certificates: AWI Quality Certification Program.
- D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.4 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.
 - 1. Shop Certification: AWI's Quality Certification Program accredited participant.
- B. Installer Qualifications: Fabricator of products, AWI's Quality Certification Program accredited participant.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver countertops only after casework and supports on which they will be installed have been completed in installation areas.
- B. Store countertops in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
- C. Keep surfaces of countertops covered with protective covering during handling and installation.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during the remainder of the construction period.
- B. Field Measurements: Where countertops are 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.
- C. Established Dimensions: Where countertops are indicated to fit to other construction, establish dimensions for areas where countertops are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-CLAD COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.
 - 1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that countertops comply with requirements of grades specified.

2. The Contract Documents contain requirements that are more stringent than the referenced quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.
 - B. Grade: Premium.
 - C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Formica Corporation.
 - b. Lamin-Art, Inc.
 - c. Nevamar; a Panolam Industries International, Inc. brand.
 - d. Pionite; a Panolam Industries International, Inc. brand.
 - e. Wilsonart LLC.
 - 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 selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors with core same color as surface (if indicated on the drawings), matte or suede finish.
 - b. Wood grains, matte finish with grain running parallel to length of countertop.
 - c. Patterns, matte suede finish.
 - E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
 - F. Core Material: Exterior-grade plywood.
 - G. Core Material at Sinks: exterior-grade plywood.
 - H. Core Thickness: 3/4 inch.
 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
 - I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
 - J. Paper Backing: Provide paper backing on underside of countertop substrate.
- 2.2 WOOD MATERIALS
- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 1. Wood Moisture Content: 5 to 10 percent.
 - B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of countertop and quality grade specified unless otherwise indicated.

2.3 ACCESSORIES

- A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. 1 grommet per every 4 feet of countertop shall be supplied to be installed at the direction of the Owner/Architect in the field after the countertop has been installed.
 - 2. Outside Diameter: 2 inches.
 - 3. Color: Black.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesive for Bonding Plastic Laminate: As selected by fabricator to comply with requirements.

2.5 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, 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 countertop 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 before disassembling for shipment.
- C. Shop cut openings to maximum extent possible to receive 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 cutouts by saturating with varnish.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for 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.
 - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 - 2. Secure backsplashes to walls with adhesive.
 - 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective countertops, where possible, to eliminate functional and visual defects. Where not possible to repair, replace countertops. Adjust joinery for uniform appearance.
- B. Clean countertops on exposed and semi-exposed surfaces.
- C. Protection: Provide Kraft paper or other suitable covering over countertop surfaces, taped to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 12 3623

SECTION 12 3669

QUARTZ AGGLOMERATE 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. Quartz agglomerate countertops.
- 2. Quartz agglomerate backsplashes.
- 3. Quartz agglomerate end splashes.
- 4. Quartz agglomerate apron fronts.
- 5. Quartz agglomerate wall panels.

B. Related Requirements:

- 1. Section 22 4100 "Residential Plumbing Fixtures" for sinks and plumbing fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Sustainable Design Submittals:

- 1. Environmental Product Declaration (EPD): Provide a Type III EPD according to ISO 14025 for the following products:
 - a. Quartz Agglomerate Countertop Materials.
- 2. Health Product Declaration (HPD): Provide a Health Product Declaration according to the requirements of the "HPD Open Standard" for the following products:
 - a. Quartz Agglomerate Countertop Materials.

C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

- 1. Show locations and details of joints.
- 2. Show direction of directional pattern, if any.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For quartz agglomerate countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cambria.
 - b. Cosentino USA.
 - c. E. I. du Pont de Nemours and Company.
 - d. LG Chemical, Ltd.
 - e. Technistone USA, Inc.

f. Wilsonart LLC.

2. Colors and Patterns: As selected by Architect from manufacturer's full range.

B. Particleboard: ANSI A208.1, Grade M-2.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 COUNTERTOP FABRICATION

A. Fabricate countertops according to quartz agglomerate manufacturer's written instructions and the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top.

2. Backsplash: Straight, slightly eased at corner.

3. End Splash: Matching backsplash.

4. **All 90 degree outside edges shall have waterfall finish.**

C. Countertops: 3/4-inch-thick, quartz agglomerate with front edge built up with same material.

D. Backsplashes: 3/4-inch-thick, quartz agglomerate.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with quartz agglomerate manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

F. Joints: Fabricate countertops without joints where possible.

G. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.

2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.3 ACCESSORIES

A. Wire-Management Grommets: Circular, molded-plastic grommets and matching plastic caps with slot for wire passage.

1. 1 grommet per every 4 feet of countertop shall be supplied to be installed at the direction of the Owner/Architect in the field after the countertop has been installed.

2. Outside Diameter: 2 inches.
3. Color: Black.

2.4 INSTALLATION MATERIALS

- A. Adhesive: Product recommended by quartz agglomerate manufacturer.
- B. Sealant for Countertops: Comply with applicable requirements in Section 07 9200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive quartz agglomerate countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- C. Secure countertops to subtops with adhesive according to quartz agglomerate manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with quartz agglomerate manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- D. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 1. Install metal splines in kerfs in countertop edges at joints where indicated. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- E. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- F. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Predrill holes for screws as recommended by manufacturer.

- G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- H. Apply sealant to gaps at walls; comply with Section 07 9200 "Joint Sealants."

END OF SECTION 12 3669

SECTION 22 4000

PLUMBING

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Include all necessary apparatus, excavating, controls, valves, and fittings required for a complete sanitary plumbing system.
- B. Refer to Specification 23 0100 for additional general requirements.

1.02 UTILITIES AND SERVICES

- A. Sanitary: Provide sanitary drainage, connect to sewer.
- B. Water: Provide domestic water, connect to water mains.

1.03 TESTS

- A. Test the plumbing system as required by the applicable plumbing code.
- B. Test water piping for a continuous period of not less than four hours at a hydrostatic pressure of not less than one hundred twenty-five (125) pounds and make free from leaks. Completely remake leaky joints with piping dry. Retest system after leaks are corrected.
- C. Plug all necessary openings in the drainage and vent piping systems and fill the entire system with water to the level of the highest vent stack above the roof. The system shall hold this water for 30 minutes without showing a drop in water level greater than 4 inches. Subject to approval of the Architect, the drainage system may be tested in sections.

1.04 STERILIZATION

- A. Disinfect the potable water system in accordance with the Plumbing Code. After disinfection, send water samples to the Local Health Department for testing. Obtain approval of the Local Health Department before the system is placed into service.
- B. Unless the Local Health Department requires otherwise, disinfect potable water piping upon completion of the installation by a mixture containing not less than 0.6 pound of high test calcium hypochlorite, or 2 pounds of chlorinated lime to each 1,000 gallons of water to provide not less than 50 ppm of available chlorine. Inject the mixture into the system and retain for not less than 24 hours, at which time the chlorine level shall be at 10ppm or greater. Then drain the system and flush with potable water until only a normal chlorine residual remains (0.2 ppm).

PART 2 – MATERIALS

2.01 PLUMBING MATERIALS

A. Potable Piping:

1. Plumbing for potable systems shall be lead-free per Public Law 99-339, Safe Drinking Water Act.
2. Lead-free is defined as no more than 0.2 percent lead in solder and solder flux, and no more than 8 percent lead in pipe and fittings.

B. Domestic Hot and Cold Water, Non-Potable Water, and Pressure Drain Piping:

1. Above Grade: Piping shall be Type L hard drawn copper tubing, ASTM B88, with wrought copper solder type fittings conforming to ANSI B16.22, or cast copper alloy solder joint fittings conforming to ANSI B16.18, or cast copper alloy flanged fittings Class 150 conforming to ANSI B16.24. Screwed joints in piping are restricted to pipe sizes 2" and smaller.
 - a. Exception: Modifications to existing steel systems may use schedule 40, galvanized steel pipe, ASTM A53, Grade A or B, with 150 pound galvanized malleable iron screwed fittings conforming to ANSI B16.3.

2. CPVC PIPING:

- a. CPVC potable water pipe and fittings shall be extruded/molded from FlowGuard Gold® CPVC compounds manufactured by Lubrizol Advanced Materials.
 - b. The pipe compound shall meet cell class 24448 and the fitting compound shall meet cell class 23447 as defined by ASTM D1784.
 - c. Both the pipe and the fitting compounds shall be certified by NSF International for use with potable water and shall be from the same compound manufacturer.
3. Below Grade: Type K copper tubing shall be used. When piping is installed within a building and within or under a concrete slab, it shall be installed without joints. Where joints are unavoidable, they shall be brazed.
 - a. Protective pipe covering shall be factory or field applied according to manufacturer's written instructions.
 - i. 2-1/2" or Larger: Products shall be Polyken No. 1027 primer and Polyken No. 930-35 tape coating, 35 mil, 21 kV dielectric strength, as manufacturer by Tyco Adhesives, Corrosion Protection Group. Minimum 1" overlap required.
 - ii. 2" and Smaller: Products shall be 27 mil plastic sleeve protectors. LSP Products Group, Plasti-Sleeve or equivalent.

C. Soil, Waste, Drain, and Vent Piping: Cast iron soil pipe, fittings and connection shall comply with CISPI guidelines.

1. Below Grade: Piping shall be service weight hub and spigot (with gasket) coated cast iron and shall conform to ASTM A74 or schedule 40 PVC.
2. Above Grade: Piping shall be hubless cast iron pipe and fittings conforming to CISPI 301.

D. Natural Gas Piping:

1. Above Grade: Piping shall be schedule 40 black steel with threaded fittings. Piping and fittings shall conform to ASME B36.10M and ASTM A53/A53M.
2. Below Grade: Piping and fittings shall be high density polyethylene conforming to ASTM D2513. Tubing shall have a pressure rating of 100 PSI.

E. Roof Drain Leaders:

1. Below Grade: Leaders shall be service weight hub and spigot coated cast iron and shall conform to ASTM A74.
2. Above Grade: Hubless cast iron pipe and fittings conforming to CISPI 301.

F. Equipment Drains and Indirect Waste: DWV copper pipe with DWV wrought copper fittings in compliance with ANSI B16.29.

G. Laboratory/Process/Acid Waste and Vent Piping: For acid and caustic resistant drains.

1. From lab waste to neutralizing tank and vent piping: Pipe and fittings shall be flame retardant Schedule 40 Polypropylene (GF "Fuseal II" PPR Group 1 63153 or Enfield "Enfusion" Type II-37206) or polyvinylidene fluoride (PVDF) (Fuseal 24/40 PVDF) or Spears Labwaste (CPVC). Polypropylene pipe shall conform to ASTM F1412 and ASTM D4101. The PVDF pipe shall conform to ASTM F1673, ASTM E84, and ASTM E D3222. Joints and fittings shall be DWV electric fusion and made of the same material as the piping.
2. From neutralizing tank to sewer main: Pipe and fittings shall be per Soil, Waste, Drain, and Vent Piping above.
3. Connection to equipment and fixtures in accessible locations shall be made with mechanical joints.
4. Connection to existing systems of different materials shall be made with appropriate adapter provided by the Contractor.

2.02 PLUMBING FIXTURES

- A. Provide plumbing fixtures complete with trim. All fixtures, trimmings, and stops shall be Grade "A" and shall be of one manufacturer. Plumbing fixtures and trim shall be as scheduled on the plans.
- B. Plumbing fixtures for use by handicapped persons shall be in accordance with ANSI 117.1. Plumbing fixtures shall be low water consumption type: 1.28 gal/flush for water closets and 0.5 gal/flush for urinals.
- C. Approved Manufacturers:
 1. Fixtures: American Standard, Toto, or Kohler
 2. Fittings: American Standard, Chicago Faucet, Kohler, T&S Brass, Speakman, Symmons, or Stern Williams

3. Flush Valves: Sloan or Delaney
4. Seats: Bemis, Beneke, Church, or Olselite
5. Drinking Fountains: Elkay, Halsey Taylor, or Oasis
6. Stainless Steel Fixtures: Elkay, Just, or Advance Tabco
7. Molded Stone, Fiberglass & Plastic Enclosures: Aquaglass, Stern Williams, or Advance Tabco

2.03 WATER HEATERS

- A. Water heaters shall be fully automatic, electric, UL Listed, complete with: insulation in accordance with ASHRAE 90A-80 (1982 requirements), glass-lined tank, coated steel jacket, adjustable thermostat, magnesium anode, and overheat control.
- B. Water heaters shall be guaranteed by the manufacturer for a period not less than 3 years after start-up. Contractor shall furnish the manufacturer's guarantee to the Owner.
- C. Water heater shall have a combination temperature and pressure relief valve having the capacity to relieve the full capacity of the heating element on both temperature and pressure relief. Valve shall be Watts and shall be ASME rated.
- D. Water heaters shall be Lochinvar, Rudd, A.O. Smith, or State.

2.04 FLOOR DRAINS

- A. Drains shall be Jay R. Smith or the approved equal as manufactured by Zurn, Wade, or Josam. All drains shall be of the same manufacturer. Floor drains shall be provided with a trap primer valve and line, JR Smith 2699, connected to the nearest cold water line serving a plumbing fixture.
- B. Floor drains in toilets and finished areas shall be JR Smith 2000 Series with 6" Type B square, adjustable strainer finished in satin nickel bronze; or equal products by Josam or Zurn. Provide vandal-proof secured tops. All floor drains shall be provided with a trap primer.
- C. Floor drains in mechanical rooms and unfinished concrete floors shall be JR Smith 2131 Series with round 11-3/4" cast iron grate, sediment bucket, and deep-seal P-trap; or equal products by Josam or Zurn. Provide vandal-proof secured tops. All floor drains shall be provided with a trap primer.

2.05 CLEANOUTS

- A. Cleanouts in cast iron soil pipe lines shall consist of cast iron ferrule and heavy brass cleanout plug with square head. Where piping is concealed in floors or walls, install cleanouts with countersunk plugs and covers in and near surface of floors or walls.
- B. Cleanouts for floors shall be Josam Series 58360 with inside caulk outlet coated cast iron internal cleanout, brass rim, and Nikaloy scoriated cover plate for light traffic secured to plug by countersunk screw for installation flush with finished floor complete with carpet marker in carpeted areas. Cleanouts in walls shall be Josam Series 58610 with stainless steel covers.

- C. Equal manufactured by Zum or Wade.

2.06 WATER HAMMER ARRESTORS

- A. Water hammer arrestors shall be selected and sized in strict accordance with Standard P.D.I. – WH201.
- B. Arrestors shall be Josam 75000 or equal by Zure, JR Smith, or Wade.

2.07 WATER PRESSURE REDUCING VALVE

- A. Where pressure of water service exceeds 70 PSI, a water pressure reducing valve shall be provided. Water pressure reducing valve for building shall be high capacity regulator Watts Series 223 rated 250 PSI inlet, set to 65 PSI outlet.

2.08 BACKFLOW PREVENTER

- A. Watts LF909 water pressure backflow preventer of same size as pipe installed in. Complete with check valve, gate valves, and test cocks. Equal by Cla-Val or Cash Acme.

2.09 VALVES

A. Gate:

1. 2" and Smaller: Class 125, solder or threaded ends, bronze body, rising stem, screwed bonnet, and solid wedge. Nibco S-111 or Nibco T-111 or equivalent.
2. 2-1/2" and Larger: Class 125, flanged ends, OS&Y, iron body, bronze trim, rising stem, and solid wedge. Nibco F-617-0 or equivalent.

B. Ball:

1. 2" and Smaller: Bronze body, blowout-proof captive stem, double Teflon seats, full ported, stainless steel or chrome plated brass ball, two-piece, threaded or soldered ends. Nibco T-585-70 or S-585-70. Or a three-piece bronze body, full port, stainless steel trim, with a blowout-proof stem. Nibco T or S-595-Y or equivalent.
2. 2-1/2" to 3": Two or three-piece bronze body, blowout-proof captive stainless steel stem, double Teflon seals and seats, full ported, stainless steel or chrome plated brass ball and threaded ends. Nibco T-585-70-66 or Nibco T-585-Y.
3. 4" and Larger: Class 150, flanged ends, carbon steel body with 316 stainless steel trim, uni-body design, full ported, blowout-proof captive stainless steel stem and ball, and Teflon seat. Nibco F-510-CS-R-66-FS.

C. Globe:

1. 2" and Smaller: Class 125, screwed ends, bronze body, inside screw, screw-in bonnet, renewable seat and disc. Nibco T-211 or equivalent.

2. 2-1/2" and Larger: Class 125, iron body conforming to ASTM A126 Class B, bronze trim, flanged ends, bolted bonnet, bronze disc, replaceable seats. Nibco F-718-B or equivalent.

D. Butterfly:

1. 2-1/2" through 6": 200 PSI working pressure, ductile iron body, aluminum/bronze disc, stainless steel shaft, resilient seat, O-ring seals, lug type for dead-end service, level operator. Nibco LD-2000 series.
2. 8" and Larger: 150 or 200 PSI working pressure, ductile iron body, aluminum/bronze disc, stainless steel shaft, resilient seat, O-ring seals, lug type for dead-end service, gear operator. Nibco LD-1000 or LD-2000 series dependent on the application.

E. Check Valve:

1. 2" and Smaller: Class 125, threaded ends, bronze body, Y-pattern, renewable seat and disc, and screw cap. Nibco T-413 or equivalent.
2. 2-1/2" and Larger: Class 125, iron body, silent check, flanged ends, globe style, spring actuated, renewable seats and disc, bronze or 316 stainless steel trim. Nibco F-910 or equivalent.

F. Vertical Check:

1. 2" and Smaller: Class 125, threaded ends, bronze body, spring actuated, inline ventrical lift type, TFE seat ring. Nibco T-480-Y or equivalent.

G. Needle:

1. 1" and Smaller: Rated at 600 PSI and 300°F, positive shut-off for gauges, brass. Weiss Instruments 25NVBR or equivalent.

2.10 STRAINERS, FLANGES, AND UNIONS

A. Strainers:

1. 2" and Smaller: Threaded ends, cast bronze body with screwed cap, and 20-mesh 304 stainless steel screen for water service. Watts Series LF777S.
2. 2-1/2" and Larger: Flanged ends, cast iron body and bolted cap, 20-mesh stainless steel screen for water service. Watts Series 77F-DI-125.

B. Flanges:

1. 1-1/2" and Smaller: Class 150, forged steel, screwed, ANSI B16.5.
2. 2" and Larger: Class 150, forged steel welding neck, ANSI B16.5.
3. Copper Systems: Class 150, cast copper or bronze, ANSI B16.23 or ANSI 16.24.

C. Unions:

1. Piping unions shall be of the ground joint type constructed from materials equivalent in alloy composition and strength to other fittings prescribed with which they are used. Union pressure classes and end connections shall be the same as the fittings used in the lines with the unions.
2. Steel unions shall have hardened stainless steel seating surfaces on both faces.
3. Copper unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

2.11 FIBERGLASS PIPE INSULATION

A. Systems:

1. All domestic hot & cold water piping.
2. Horizontal storm piping and roof drain bodies

B. Insulation:

1. One-piece fibrous glass sectional pipe insulation with factory applied glass reinforced aluminum foil and white kraft paper flame retardant vapor barrier jacket, with self-sealing longitudinal jacket laps and butt strips; average thermal conductivity not to exceed $0.23 \frac{\text{BTU-in}}{\text{hr-ft}^2\text{-}^\circ\text{F}}$ at a mean temperature of 75°F. Insulation thickness shall be in accordance with IECC Table C403.2.10. Insulation shall have flame spread index not greater than 25 and a smoke developed index not greater than 50.

C. Insulation shall be:

1. Johns-Manville Micro-Lok HP, or,
2. Owens Corning SSL II

D. Insulating cement shall be:

1. Johns-Manville No. 301, or
2. 48 Insulations Quik-Set, or
3. Rockwood Mfg. Co. Delta-Maid One Shot

E. Vapor barrier coating shall be:

1. Foster Tite Fit 30-35, or
2. Vimasco 740, or
3. Insul-Coustic F.R.V.B. IC-501, or
4. Childers Cil-Perm CP-30

F. Breather coating shall be:

1. Foster Sealfas 30-36, or
2. Insul-Coustic Permsure IC-102, or
3. Vimasco 713, or
4. Childer Chil-Seal CP-50

2.12 PREMOLDED LAVATORY INSULATION

- A. Exposed waste and water piping under lavatories for use by handicapped persons shall be insulated with molded flexible vinyl insulation, finished in light gray. Insulation shall be fastened with nylon fasteners. Lavatory insulation systems shall be Truebro Handi Lavi-Guard or equal by ProWrap by McGuire Mfr.

PART 3 – EXECUTION

3.01 GENERAL

- A. Make connections to all fixtures, traps, and similar items. Place into operation all equipment.
- B. Refer to architectural drawings for the exact location of fixtures and drains. Determine roughing dimensions from the manufacturer of the equipment furnished on the job.

3.02 PLUMBING FIXTURES

- A. Grout between plumbing fixtures and walls and/or floors.
- B. For connection of floor-outlet water closets, brass floor flanges shall be used. The joints between closet trap and flange shall be made tight with gaskets.
- C. Connection of fixture traps from lavatories, drinking fountains, service sinks, etc. to cast iron shall be made with DWV type copper.
- D. Seal, using sealant meeting requirements of Federal Specification TT-S-230, joint between urinals and wall and at water closet and floor.

3.03 DRAINS

- A. Set floor drains with top flush with finished floor.

3.04 WATER HEATERS

- A. Provide drain pan under water heater. Pipe relief valve discharge to drain pan. Pipe drain pan drain to floor drain, or to the nearest utility or janitor's sink. Do not make direct connection to drain.

3.05 CLEANOUTS

- A. Provide cleanouts where required by the applicable plumbing code.

- B. Cleanouts shall be the same size as pipe line in line sizes 4" and smaller. Pipe lines larger than 4" shall have 4" cleanouts.
- C. Cleanouts installed outside buildings shall be same as in floors and shall be flush with grade and have a minimum 6" thick, 12"x12" concrete pad poured around cover. Cover shall be flush with top of concrete.

3.06 PRESSURE REDUCING VALVES

- A. Provide for a pressure test of the water service. Where pressure exceeds 70 PSI, provide a pressure reducing station. Pressure reducing station shall include a pressure reducing valve, bypass with globe valve, pressure gauges, and isolation valves at entering and leaving sides.

3.07 BACKFLOW PREVENTER

- A. Provide backflow preventer in incoming domestic water service where required by local codes or utility requirements.
- B. Provide a full size copper drain line from unit to floor drain.

3.08 SOIL, WASTE, AND VENT PIPING INSTALLATION

- A. Install Soil, Waste, and Vent piping in accordance with the International Plumbing Code (IPC).
- B. All excavation and backfill shall be in accordance with 31 0000, "Earthwork."

3.09 POLYPROPYLENE AND PVDF PIPING INSTALLATION

- A. General: Fusion and mechanical joints shall be installed by manufacturer certified experienced pipe fitters and as per the manufacturer's instructions. The Contractor shall provide all tools and equipment necessary for proper installation. The Contractor shall provide for supports and thermal expansion to meet the manufacturer's recommendations.
- B. Horizontal Piping: Support horizontal piping at end of branches and at change of direction or elevation. Clamp piping to control thermal expansion per manufacturer's installation instructions.
- C. Vertical Piping: Support risers with standard riser clamp or wall brackets.
- D. Air Plenums: Piping installed in air plenums shall be installed with piping materials that have a flame/smoke rating of 25/50 or less per ASTM E84 or piping shall be wrapped with 3M Fire Barrier Plenum Wrap to meet a flame/smoke rating of 25/50 or less per ASTM E84.

3.10 APPLICATION OF PREFORMED FIBERGLASS PIPE INSULATION

- A. Apply insulation to straight pipes and tubes as follows: Use preformed pipe insulation when able. Use pipe and tank insulation for larger diameter piping where preformed insulation is not available. To meet required thickness, apply multiple layers of insulation with longitudinal and end seams staggered.
 - 1. Keep SSL adhesive and contact surfaces clean and free of dirt and moisture. Seal immediately once adhesive is exposed. Seal circumferential joints with a minimum 3" wide tape. Rub the longitudinal

joints firmly with a squeegee and secure with two outward clinching staples evenly spaced in each 3 foot section of insulation.

2. Where vapor retarders are indicated: Seal staples and any penetrations in the insulation with vapor-retarder mastic. Apply vapor retarder to ends of insulation at intervals of 15-20 feet to form a vapor retarder between pipe insulation segments.
3. Taper the ends of insulation at terminations. Seal all raw edges of insulation with mastic.

B. Apply insulation to flanges as follows:

1. Apply preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation segments the same as overall width of the flange and bolts, plus twice the thickness of the pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with a collar fabricated for preformed pipe insulation.
4. Fill all voids and seal all raw edges of insulation with vapor retarder mastic.

C. Apply insulation to fittings and elbows and mechanical grooved couplings as follows:

1. Apply mitered sections of pipe insulation, or fiberglass blanket insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire, tape, or bands.
2. Cover fittings with standard PVC fitting covers. Secure the fitting covers by wrapping the ends with minimum 1-1/2" wide PVC tape. Overlap a minimum of 2" and do not stretch the last 2" of tape. Secure the throat with a stainless steel tack.
3. On systems requiring a vapor barrier, seal the throat with vapor barrier mastic (the PVC fitting cover is to act as the vapor barrier).

D. Apply insulation to valves and specialties as follows:

1. Apply premolded pipe insulation sections of the same material as straight segments of pipe insulation, sized and cut to fit around the valve body, over the flanges, and around the bonnet. Fill all voids and seal all raw edges in insulation with vapor retarder mastic. Caulk around valve stem cutout.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation. For check valves, arrange insulation for access to strainer basket without disturbing insulation.
3. Apply insulation to flanges as specified for flange insulation application.

END OF SECTION 22 4000

SECTION 23 0100

MECHANICAL GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 INTERPRETATION OF SPECIFICATIONS

- A. General provisions and requirements apply throughout. Cross references or general provisions may be repeated for convenience or emphasis only.
- B. Interpret the following as indicated:
 - 1. “or equal”:
 - a. “in accordance with the General Conditions” or
 - b. “an equivalent with respect to style and function”
 - 2. “approved”:
 - a. “approved or accepted by Governing Officials or the authorities having jurisdiction”
 - 3. “provide”:
 - a. “furnish and install, connect, and test, and contract for the performance of same”
 - 4. “wiring”:
 - a. “required conductors or cable and raceway system, including fittings, boxes, connections, supports, hardware, labeling, and miscellaneous related accessories”
 - 5. “work”:
 - a. “materials completely provided. Which shall include all activities and services necessary to meet contract requirements, including inspection and replacement as specified of any defective element.”
 - 6. “materials”:
 - a. “equipment and/or materials.”
 - 7. “.”:
 - a. “shall be/have” Specifications following a colon are criteria which apply to the term proceeding the colon.

1.02 INSTRUCTIONS TO BIDDERS

- A. Bidders are advised to visit the site and examine the existing conditions before submitting bids, as no allowance will be made for lack of knowledge of existing conditions where such conditions might reasonably be determined by observation.

1.03 SUBSTITUTIONS

- A. Utilize only those materials specifically listed by the Contract Documents. Substitutions of alternative types of major materials will not be acceptable unless a written "prior" acceptance is obtained at least seven (7) working days before the Date for Submittal of Bids. Requests for prior acceptance of alternative materials must conform to the procedures for submitting shop drawings and product data.
- B. The design and layout shown on the plans are based on the manufacturer indicated on the equipment schedule. If equipment other than that used as the basis of design is submitted for use on this project, it shall be the responsibility of the contractor, including costs for redesign of these systems. Submittals shall clearly indicate any required changes to the building systems affected by substitution of equipment.

1.04 GENERAL SCOPE OF WORK

- A. The Contract Documents establish the basic systems designs and the detail design of the work, or establishment systems or materials performance criteria and minimum design requirements. In either case, certain aspects of the work or of the detail design are not established completely. Establish said work and details in accordance with industry norms and practice to suit the needs of the job. The work shall provide for complete systems and services unless otherwise specified herein.
- B. The work covered by this specification shall include furnishing supervision, labor, supplies, materials, equipment, tools, services, taxes, and dollar costs required to construct and install the complete mechanical systems as specified herein and as shown by the plans and other relevant documents. Without limiting the generality thereof, the major items of the work are:
 - 1. Utility connections and metering, including temporary connections.
 - 2. Heating, Ventilation, and Air Conditioning systems.
 - 3. Specialty systems as specified or shown by plans.
 - 4. Special tools for maintenance or inspection of materials.
 - 5. Necessary services and support work, including scaffolding, and hoisting.
 - 6. Permits, inspection fees, approvals, licenses, registration, certifications, taxes, and specified or miscellaneous dollar costs.

7. Shop Drawings and Product Data Submittals as specified.
8. Inspections, tests, and systems and equipment demonstrations.
9. Specified or necessary documentation and notifications.
10. Materials transportation, delivery, handling, storage, protection, guarding, and inspecting.
11. Instruction of Owner's Operating and Maintenance Personnel.
12. Temporary utility and site distribution system(s).
13. Demonstration of completion of the work.
14. Replacement of Defective Work.

1.05 CODES AND STANDARDS

- A. The mechanical installation, equipment, materials, and workmanship shall as a minimum be in accordance with the requirements and recommendations of the applicable local codes and the following:
 1. Heating, Ventilation, and Air Conditioning: NFPA 90A and NFPA 96, current edition.
 2. Applicable federal, state, and local laws, codes, ordinances, and rulings of Governing Officials having jurisdiction.
 3. Utility and service company regulations and requirements.
- B. Codes and standards cited establish only the minimum requirements for the work. Where requirements of the contract Documents exceed requirements of the Codes and Standards, provide the work in accordance with the express requirements of the Contract Documents. Do not reduce the quality of the design or eliminate future capacity or options without acceptance by the Engineer, even if proposed changes meet minimum Code requirements.
- C. The latest editions of the specifications, standards, and listings of the following organizations are made a part of this specification. Mechanical work, unless otherwise indicated, shall comply with their requirements and recommendations wherever applicable:
 1. Underwriter's Laboratories, Inc. (UL)
 2. National Fire Protection Association (NFPA)
 3. American National Standards Institute (ANSI)
 4. American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

5. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)

- D. Material shall be installed as required for the Seismic Rating of the area of the project. Submit installation details.

1.06 COMPLIANCE OF WORK WITH CODES AND ORDINANCES

- A. Work shall comply with the requirements of local ordinances and Codes as modified and amended by Governing Officials having jurisdiction.
- B. Notify the Architect in writing of any instance where any requirement of the Contract Documents is in conflict with any Code or ordinance, so that any required changes may be made in a timely manner and without the need for remedial work. Do not perform work contrary to Codes, ordinances, regulation, or rulings of Governing Officials.

1.07 RELATED WORK IN OTHER DIVISIONS

- A. The following work is generally specified by other divisions of specifications, except for specific applications as called for by Division 23 specifications or plans:
1. Installation of building access panels and plaster frames.
 2. Painting.

1.08 PERMITS AND COSTS

- A. Obtain and pay for permits, assessments, taxes, fees, licenses, etc. necessary for the installation of the work. Deliver to the Owner all such certificates of inspection or occupancy issued by Governing Officials.

1.09 SHOP DRAWINGS AND PRODUCT DATA

- A. Submit shop drawings and product data for review for major systems and materials, including, but not limited to:
1. Cleanouts
 2. Domestic Water Heaters
 3. Floor and Roof Drains
 4. Plumbing Fixtures and Accessories
 5. Plumbing Specialties
 6. Fire Protection System Layout (at same scale as the mechanical floor plans)

7. Sprinkler Heads
 8. Fire Protection System Appurtenances (compressors, valves, etc.)
 9. Air Distribution Products and Accessories
 10. Air Conditioning and Heating Units with coil, fan, filter, and compressor data
 11. Dampers
 12. Duct Lining
 13. Ductwork and Accessories
 14. Equipment Layout Drawings
 15. Fans (with curves for fans with motors 1/2 HP and larger)
 16. Flexible Ductwork
 17. Insulation (duct and pipe)
 18. Motor controls
 19. Sheet Metal Work
 20. Temperature Control System including control diagrams, control panel layouts, descriptions of operation and cuts of instruments
 21. Valves and Piping Specialties
- B. Prepare shop drawings giving locations for major equipment, ductwork, and piping, based on equipment to be installed (as ordered), and submit these for review. Shop drawings shall show the location and weight of each item of roof mounted equipment, roof openings, pads, sleeves, anchor bolts, etc. and shall be of a scale not less than that of the contract plans. The shop drawings shall give all clearances recommended by the manufacturer for the service or removal of equipment/materials.
- C. Sheet metal shop drawings shall be submitted, based on field measurements of actual conditions and the equipment submitted and approved for this project. Sheet metal shop drawings shall clearly indicate all changes required to accommodate actual field conditions such as interference with structural or other building elements and systems.
- D. Submittals shall include catalog cuts, bulletins, plates, drawings, diagrams, schedules, and any other information as necessary to indicate the relative characteristics, ratings, and capacities of the respective items of equipment.

- E. Submittals shall be checked for accuracy and coordinated between the involved trades before submission for review and acceptance by the Engineer. Notify the Architect in writing where shop drawings indicate elevations of piping or ducts which would place pipe or duct below lighting fixtures or ceilings, or that would require the lowering of lighting fixtures or ceilings. The Architect shall likewise be notified of any other similar type conflict between materials as installed, or shown by plans or Shop Drawings.
- F. Each shop drawing, product data sheet, catalog cutsheet, etc. submitted shall bear on its face an acceptance date and signature of the Contractor, indicating that the submission has been checked and accepted for installation by the Contractor.
- G. Submit complete drawings and product data for any modified materials or proposed substitution of equivalent materials. When such materials are required or proposed, provide technical information on operating conditions, ratings, and capacity of the materials, including any and all related changes necessary or desirable to the basic design of any involved system in the facility. Where standard material (equipment) is modified to suit the conditions required, provide certification from the manufacturer of the required operating conditions, ratings, and capacities of the materials. Any submittal of alternate materials shall be in accordance with the General Conditions.
- H. Submittals for review shall be fully in accordance with and consistent with the General Conditions, and with the requirements of the technical specifications and plans. Any technical exceptions shall be clearly and fully stated in one place.
- I. The Engineer's review of shop drawings and product data shall not change the requirements of the contract documents, nor shall this review relieve the Contractor of full responsibility for any and all errors or omissions in said documentation.
- J. Six (6) copies of each submittal shall be provided to the Architect for appropriate distribution and action. Four (4) copies of each submittal shall be returned to the Contractor. Three (3) copies of each final submittal shall be included in the project manuals.
- K. Coordinate the structural, architectural and systems changes required for the mechanical equipment actually used on the project.
- L. Submit a complete plan supports and restraints for the Seismic requirements of this zone.

1.10 DOCUMENTATION, MANUALS, AND RECORD PLANS

- A. Prepare manuals containing certificates or letters of warranty or guarantee, operating and maintenance instructions and recommendations, test results, and other data specified herein, and deliver the manuals to the Owner's Representative upon completion of the work. These manuals shall include information on major materials (such as major equipment) and on special systems or materials. Any special tools required for service or repair shall be listed.

- B. Manuals shall be ring binders with the name of the manual, project, Architect, Engineer and Contractor placed on the cover of each manual. Each manual shall contain a table of contents listing the items contained therein by number and name. Each item shall be properly indexed with a standard metal reinforced cover page tab, with item number and name printed on tab per se.
- C. Installation, Operation, and Maintenance (IOM) Manuals for major materials (equipment) shall be provided in separate manuals, or sets of manuals, for each major system or item of material. These IOM Manuals shall contain detailed instructions for operation and maintenance of the major equipment, devices and materials requiring periodic inspection or service. IOM Manuals shall contain the following items of information:
 - 1. Manufacturer's maintenance and operation recommendations.
 - 2. Final (corrected) shop drawings and product data information.
- D. Make written certification to the Architect that tests, checks, verifications, and settings have been satisfactorily completed. Where any item cannot be certified as correct, make a written report of the relevant facts and test data.
- E. Have bonds, guarantees, receipts, affidavits, etc., called for in the various specification articles prepared and signed in advance of final demonstration of completion and acceptance of the work. Deliver to the Architect at or before the time of inspection with a letter of transmittal, listing each item included.
- F. On a set of contract documents, maintain an accurate record of all deviations made during the progress of the work from the contract documents (plans and specifications). Also, maintain an accurate as-built record of the dimensional locations of outside underground materials such as meters, valves, and incoming utility lines, piping, or conduits. The marked-up (record) documents shall be available on the site for inspection during normal working hours.

1.11 SCHEDULING AND CONDUCT OF THE WORK

- A. Work shall be performed on schedule and in a manner as described by the Special Conditions of the Specifications and by Division 15 specifications. Plan, coordinate, and execute the work to meet building schedules and so as not to produce interference between the work of the various trades, or with any special job site construction.
- B. Specified tests may be witnessed by the Architect or Engineer, at their option. Provide at least five (5) days' notice to the Architect of each test schedule, so that the Architect and Engineer may plan to attend the test if desired.
- C. The Architect or Engineer may inspect the site at any time, at their option. In order that they may plan to inspect the job after the installation of major materials and before the materials are enclosed from ready view, notify Architect at least five (5) days in advance of the following construction milestones:

1. Underground piping installed, but prior to slab being placed or trenches backfilled.
 2. Ductwork or piping installed, but before installation of walls or dropped ceilings, and before application of any insulation.
- D. Work shall be performed within the access, security, proprietary, and housekeeping conditions specified.

1.12 TRANSPORTATION AND DELIVERY

- A. Provide and pay for the transportation, storage and handling of materials. Materials shall be delivered to the job site in ample quantities to provide for the uninterrupted progress of work as scheduled. Where necessary, provide expedited or special shipping or handling of materials to prevent interruption of the overall job progress.

1.13 SPECIALIZED SERVICES

- A. Provide any necessary specialized services, such as accredited direct factory representative, as may be required for survey, inspection, supervision, installation, calibration, test, placing of equipment into operation, or for trouble shooting during the period of replacement of defective work.
- B. Provide for the installation of control systems and related low voltage (generally 50 volts or less) wiring for the building systems covered by Division 23 specifications. Control systems and wiring shall meet the requirements of Division 26 specifications.

1.14 GUARANTEES / WARRANTIES

- A. Leave the entire mechanical system installed under this contract in proper working order. Replace any work or material which develops defects, except from ordinary wear and tear, within one (1) year from the date of beneficial acceptance by the Owner.
- B. The materials of the mechanical systems shall have the manufacturer's and/or supplier's guarantee or warranty put into effect by execution and filing of any and all related papers. For one (1) year from the date of acceptance, obtain service or repair under the terms of any said guarantee or warranty in the Owner's behalf.
- C. For a period of one (1) year from the date of acceptance, upon receipt of notification from the Architect of the failure of any material or workmanship, replace the failed material or workmanship, including removal and replacement, or repair.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Equipment and materials shall be new, of the best quality and grade of the relative quality established, of manufacturer's standard, established product line. Where applicable standards are established, shall conform to National Board of Fire Underwriter's requirements and bear the seal of approval of a recognized and approved testing agency, as accepted by the Engineer.
- B. Once a product line has been established, it shall be consistently maintained throughout the entire installation.
- C. Equipment and components that interact to form equipment assemblies and/or systems shall be of the same manufacturer to the greatest extent possible.

2.02 BUILDING ACCESS PANELS

- A. Building access panels shall be of metal construction with hinged door and an inconspicuous frame. The size shall be as required to provide proper access for maintenance and service, with a minimum size of 18"x18".
- B. Access panels shall be Milcor "DW", or equal, for drywall locations and Milcor "K", or equal, elsewhere.
- C. Access panels shall be "B" label where installed in rated walls.

2.03 PAINT

- A. Paint used for touching up factory painted apparatus shall be top quality and selected to match the factory finish.
- B. Cold galvanizing compound shall be Sherwin-Williams "Zinc-Glad Primer" or equal.
- C. Rest Preventative paint shall be "Rust-Oleum" or equal.

2.04 ELECTRICAL MATERIALS

- A. Electrical materials shall meet the requirements of Division 26 specifications.

PART 3 – EXECUTION

3.01 GENERAL DESIGN AND WORK

- A. Read and study relevant documents, including Codes. Become familiar with the site, the scope of work and services, type of general construction, and the civil, structural, architectural, interior design, mechanical, electrical and special system plans and specifications.
- B. Establish design and work details as necessary to provide for the complete installation of materials and the successful operation of systems. Notify the Engineer in writing and in a timely manner if

responsibilities or directions are not clear, or if assistance is desired in determining the needs or requirements for any particular item.

3.02 INTERFERENCES AND COORDINATION

- A. The plans showing mechanical work are generally diagrammatic in nature. The plans shall not be scaled for any dimension.
- B. Coordinate the work with that of different trades so that interferences between the mechanical work and other work will be avoided. Refer to building plans for guidance as to dimensions, finished grades, ceiling heights, door swings, room finishes, location of ducts, pipes, equipment, outlets and similar details that are required, and coordinate final installation with work as actually installed. Outlets and connections for equipment or devices to be installed by different trades shall be coordinated to assure that the outlets and connections are properly sized and located with respect to the equipment served and the surrounding areas.
- C. Offsets and fittings in lines, and adjustments to equipment and fixture locations, as accepted by the Owner's representative, shall be provided to accomplish the work in a satisfactory manner.
- D. If interference develops, the Owner's representative shall decide which item of equipment, ductwork, piping, conduit, etc. must be relocated, regardless of the sequence of installation of the affected items.

3.03 SPACE REQUIREMENTS

- A. Materials shall fit into the space provided in the building or property and shall be installed at such time and in such manner as to avoid damage to the building structure or property, as required by the job progress.
- B. Materials requiring normal servicing or maintenance shall be made easily accessible, including associated connection devices, wiring and/or piping.
- C. Ductwork, piping, raceways, and supports must be kept as close as possible to walls, floor slabs, columns, etc., so as to take up a minimum amount of space. Offsets and fittings required to accomplish this shall be furnished and installed.
- D. Ductwork, piping or other such non-electrical materials shall not be located within 42-inches of switchboards, panelboards or motor control centers, including the space horizontally from the electrical equipment, and the space from floor to structural ceiling over electrical equipment.

3.04 WORKMANSHIP

- A. Workmanship shall be of the highest quality and no substandard work will be accepted. Work shall be done by workmen skilled in the trade involved.

3.05 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Protect materials from the elements and other causes of damage during shipment, storage, and erection, until final acceptance by the Owner.
- B. During construction, cover the fronts of equipment to prevent marring or defacing.
- C. Open ends of ductwork, pipe, or conduit shall be closed with temporary closures or plugged when work is stopped, to prevent debris from entering.
- D. Air handling systems shall have filters installed before any operation of the system. Exhaust fans may be protected using temporary filters cut from roll media and fastened over air inlets.

3.06 INSTALLATION OF MATERIALS

- A. Materials shall be installed in accordance with the manufacturer's published recommendations for installation, in accordance with any listing restrictions of a certifying laboratory or agency, and in accordance with the requirements of involved Government Agencies or local Governing Officials.
- B. Materials shall be set level, square and plumb, properly oriented, aligned and secured in the location indicated.
- C. Lock washers shall be installed under nuts which bear on metal.
- D. Surfaces to be painted shall be clean and free of dirt, dust, oil and rust.
- E. Where galvanizing is broken during fabrication or installation (including tack welding), recoat exposed areas with cold galvanizing compound.
- F. Exposed iron or steel materials such as ductwork, piping, conduits and supports (but not equipment, devices, and components), including those exterior to the building, where exposed to view without removing ceilings or access panels shall be painted with one coat of rust inhibiting paint. The type and color of paint shall be acceptable to the Architect.
- G. Materials and supports above ceilings, but visible through grilles or diffusers, etc., shall be painted flat black unless inappropriate due to listing restrictions or function.

3.07 BUILDING ACCESS PANELS

- A. Building access panels shall be installed where required to provide access for service and maintenance for equipment, fans, heaters, ductwork, damper operators, valves, traps, instruments, etc., including associated connection devices, wiring and/or piping. In general, only one (1) access panel shall be provided for an item of equipment and associated connecting devices, wiring and/or piping. Where feasible one access panel may serve several items of equipment.
- B. Access panel location and size shall be coordinated with materials/ equipment served to allow for installation, operation, inspection and maintenance as necessary, including testing and recalibrating.

Access panels for fire dampers and/or duct smoke detectors shall allow resetting of the dampers and/or detectors. Coordinate the requirements between all involved trades.

- C. Access panels are not required for materials above lay-in (push-up) ceiling systems.

3.08 SUPPORTING DEVICES AND MATERIALS

- A. Necessary supports for properly mounting materials shall be provided. Supports shall provide adequate and rigid mounting for materials, unless otherwise indicated by plans or functionally required. Supports shall be fabricated and installed in a neat and workmanlike manner, and care shall be taken that at no time shall any portion of the building structure be overloaded or weakened in any manner.
- B. Unless otherwise indicated, select and size foundations, supports, and fasteners.

3.09 CUTTING AND PATCHING

- A. Coordinate with the various trades sufficiently ahead of the construction of any floor, wall, ceiling, roof, or other element, and identify openings, foundations, pads, curbs, and inserts that will be required for the work. Do not cut any structural member without having received written permission from the Architect.

3.10 CLEANING

- A. Clean equipment, fixtures, devices and other materials furnished or set in place. Plaster, paint, stickers, rust, stains, and other foreign matter or discoloration shall be removed. Surfaces shall be polished and free of paint, oil, grease, and other dirt and debris. Touch up or refinish materials which have been damaged or marred during the construction process.

3.11 LUBRICATION

- A. After installation of equipment, motors and equipment components which were furnished or installed by the Contractor and require lubrication using oil, grease, or special type lubricant, shall be lubricated as recommended by the manufacturer.

3.12 MARKING AND LABELING

- A. Provide marking and labeling for major items of equipment, controls, and materials.

3.13 CHECKS AND TESTS

- A. Make tests as reasonably required by the Engineer to prove the integrity of the work, and leave the complete installation in first class condition and ready for operation.
- B. Individual systems shall be thoroughly tested and demonstrated to meet full functional requirements.

- C. See sections 23 05 93 and 23 09 00 for additional testing requirements.

3.14 DEMONSTRATION OF COMPLETION

- A. The project shall be demonstrated to be completely installed and calibrated and suitable for acceptance by the Owner. Suitable acceptance inspections shall be performed to determine whether the Contractor has completed the work in a proper and workmanlike manner, that he has installed the work in accordance with the intent of the plans and specifications, that the installation is apparently safe for use by building occupants, including operating personnel, and that in the Architect and Engineer's opinion the work is satisfactory for the Owner to accept.

3.15 INSTRUCTIONS TO OPERATING PERSONNEL

- A. Instruct Facility Operating Personnel in the safe and correct procedures for cleaning, checking, logging, lubricating, testing, trouble shooting and operating of equipment and systems. The instructions shall be conducted at the job site by qualified personnel of the Contractor, Supplier, or Manufacturer, and shall include reviewing the operation instructions and maintenance recommendations with qualified Facility Operating Personnel.

END OF SECTION 23 0100

SECTION 23 0593

TEST, ADJUST, AND BALANCE

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Perform testing, adjustment, and start-up of mechanical systems as described herein.
- B. Testing and balancing shall be performed by an independent test and balance agency that specializes in and whose business is limited to testing and balancing of air conditioning systems. The Engineer, acting for the Owner, shall approve this agency, which shall be one fully certified by AABC or NEBB.
- C. Testing and balancing agency, as part of its contract, shall act as authorized inspection agency, responsible to the Engineer and Owner, and shall, during the test and balance, list all items that are not installed correctly, require correction, or have not been installed in accordance with contract documents.
- D. Testing and balancing shall be performed in complete accordance with AABC National Standards, 1982, 4th Edition.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Provide all instruments, equipment, materials, and recording devices necessary for tests and adjustments.

PART 3 – EXECUTION

3.01 GENERAL

- A. Perform initial test and balance immediately after equipment has been started up and before building is occupied.
- B. After initial test and balance has been completed, the test and balance agency shall re-balance the systems based on space temperatures, under actual occupied conditions, to provide CONSTANT even temperatures in each area. The control settings shall also be adjusted to achieve comfort in the spaces, and prevent one unit from "fighting" the other units.
- C. Installation shall not be considered complete until final reports by agency have been submitted and approved by the Consulting Engineer.

3.02 AIR BALANCE:

- A. Test system with fan speed set to maximum conditions. Make pitot tube traverse of main supply, exhaust and return ducts; determine CFM at fans and adjust fans to design CFM.
- B. Test and record system static pressure at fan suction and discharge.
- C. Test and record cooling apparatus entering and leaving air temperatures, dry bulb, and wet bulb.
- D. Test, balance, adjust, and tabulate the air quantities of all supply, return, exhaust, and outside air ducts and air terminal devices within 10% of indicated values.
- E. Adjust flow patterns from air terminal units to minimize drafts as equipment permits.

3.03 CONTROL PERFORMANCE CHECK

- A. The results produced by the operation of automatic controls shall be checked by the testing agency; controls requiring adjustment shall be listed and reported to the Contractor. This does not reduce the responsibility of the Contractor for the checking and adjustment specified under the Temperature Control Section.

3.04 REPORTS

- A. Reports shall be certified by the testing engineer that the methods used and the results obtained are as specified herein.
- B. The test and balance contractor shall, as part of its responsibility, submit written reports of all mechanical system deficiencies to the Project Manager for action.
- C. The final records of readings, calculations and adjustments shall be submitted to the Architect. The final report shall include a single line system schematic diagram indicating the location of testing points referenced in the report. Provide five (5) copies prior to final inspection.

END OF SECTION 23 0593

SECTION 23 0700

HVAC INSULATION

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Provide insulation for ductwork furnished under this division.
- B. Provide insulation for piping furnished under this division.

1.02 QUALITY ASSURANCE

- A. Products of the manufacturers listed under PRODUCTS will be acceptable for use for the specific functions noted. Adhesives, sealers, vapor barriers and coatings shall be compatible with the materials to which they are applied, and shall not corrode, soften or otherwise attack such material in either the wet or dry state.
- B. Material shall be applied subject to their temperature limits. Application of insulating materials or finishes shall be in accordance with manufacturer's published recommendations unless otherwise specified herein.
- C. Insulation shall be applied by experienced workers regularly employed for this type of work.

1.03 RATING

- A. Insulation and accessories such as adhesives, mastics, cements, tape and jackets, unless specifically excepted, shall have a flame spread rating of not more than 25 and a smoke developed rating of not more than 50. Materials which are field applied may be tested individually.
- B. Flame Spread and Smoke Developed Ratings shall be determined by Method of Test of Surface Burning Characteristics of Building Materials, NFPA 255, ASTM E84, UL 723.
- C. Products or their shipping cartons shall bear a label indicating the flame and smoke rating do not exceed above requirements.
- D. Treatment of jackets or facings to impart flame and smoke safety shall be permanent. Water soluble, fugitive, or corrosive treatments shall not be used to meet RATING criteria.
- E. Certify in writing prior to installation, that products to be used will meet RATING criteria.
- F. The perm rating for vapor barriers shall be not more than 0.05 perms and the rating for adhesives, coatings and mastics shall be not more than 0.25 perms.

PART 2 – PRODUCTS

2.01 FIBERGLASS BLANKET INSULATION FOR DUCTWORK

A. Systems:

1. Unconditioned outside air ductwork.
2. Makeup air ductwork.
3. Concealed supply air ductwork.

B. Blanket type insulation:

1. K-value not to exceed $0.27 \frac{\text{BTU}\cdot\text{in}}{\text{hr}\cdot\text{ft}^2\cdot^{\circ}\text{F}}$
2. at a mean temperature of 75°F.
3. Minimum density of $0.75 \frac{\text{lb}}{\text{ft}^3}$
4. 2" thick.

C. Insulation shall be:

1. Johns-Manville Microlite FSK Faced Wrap, or
2. Owens Corning Fiberglass Faced Duct Wrap FRK 25, Series ED-100, or
3. Certainteed Ultralite Duct Wrap Type IV

D. Fire retardant adhesive for securing insulation to ductwork and for sealing 2" facing flange at circumferential joints shall be:

1. Benjamin Foster 85-20, or
2. Insul-Coustic IC-225, or
3. Vimasco 733, or
4. Childers CP-82, or
5. Eplux Cadalar 400

E. 3-inch wide foil reinforced kraft tape shall be:

1. Arno C-430, or

2. Fason 0822, or
3. Nashua FSK

2.02 FIBERGLASS LINER FOR DUCTWORK

A. Systems:

1. Supply ductwork exposed in the space.
2. Supply ductwork for the first 10' from the air handling unit, or through the second elbow, counting the one which turns the duct horizontally from the air handling unit.
3. Return & transfer air ductwork

B. Duct liner:

1. Fibrous glass type with one side coated with a black fire-retardant compound
2. K-value not to exceed $0.27 \frac{\text{BTU}\cdot\text{in}}{\text{hr}\cdot\text{ft}^2\cdot^{\circ}\text{F}}$ at a mean temperature of 75°F
3. Minimum density of $0.75 \frac{\text{lb}}{\text{ft}^3}$
4. 2" thick.

C. Duct liner shall be:

1. Johns-Manville Microlite, or
2. Owens Corning Aeroflex Type 150, or
3. Certainteed Ultralite #150

D. Fire retardant adhesive for securing insulation to ductwork and for sealing 2" facing flange at circumferential joints shall be:

1. Benjamin Foster 85-20, or
2. Insul-Coustic IC-225, or
3. Vimasco 733, or
4. Childers CP-82, or
5. Eplux Cadalar 400

2.04 PIPING INSULATION

- A. Systems:
1. Condensate piping.
 2. Refrigerant piping.
- B. Piping insulation installed inside the building, except for refrigerant suction service:
1. Fiberglass preformed pipe insulation with a white all-service jacket/vapor barrier.
 2. K-value not to exceed $0.23 \frac{\text{BTU}\cdot\text{in}}{\text{hr}\cdot\text{ft}^2\cdot^{\circ}\text{F}}$ at a mean temperature of 70°F
 3. For pipes smaller than 2", insulation shall be 1" thick
 4. For pipes 2" to 4", insulation shall be 1-1/2" thick
 5. For pipes larger than 4", insulation shall be 2" thick
- C. Piping insulation installed outside the building, except for refrigerant suction service:
1. Prefabricated $2 \frac{\text{lb}}{\text{ft}^3}$ polyisocyanurate insulation, Trymer 9501 or approved equal, with waterproof mastic and glass fiber jacket finished with an aluminum jacket with waterproof silicone joints
 2. K-value not to exceed $0.14 \frac{\text{BTU}\cdot\text{in}}{\text{hr}\cdot\text{ft}^2\cdot^{\circ}\text{F}}$ at a mean temperature of 70°F
 3. For pipes smaller than 4", insulation shall be 1" thick
 4. For pipes 4" and larger, insulation shall be 1-1/2" thick
- D. Piping for refrigerant suction service and other services as specified or noted:
1. Closed-cell insulation
 2. 1/2" thick
 3. Basis of design:
 - a. AP Armaflex 25/50, or
 - b. K-FLEX INSUL-TUBE
- E. Insulation shall be continuous over all valve bodies, fittings, and wall & floor penetrations. Do not insulate unions on hot water piping, nor instruments, gauges, valve handwheels, etc. on any piping.
- F. All piping insulation covering water-carrying piping which is exposed to the weather and subject to bursting from freezing temperatures shall be oversized to accommodate heating cables.

PART 3 – EXECUTION

3.01 APPLICATION OF FIBERGLASS BLANKET DUCT INSULATION

- A. Wrap insulation around ducts with circumferential joints butted and longitudinal joints overlapped a minimum of 2". Adhere insulation to ducts with 4" strips at 8" on center of fire-retardant adhesive; additionally, for ducts over 24" wide, impale insulation on the bottom of the ducts on metal pins, on maximum 18" centers, welded to the duct and secure with speed washers. On circumferential joints, seal the 2" flange on the insulation facing with fire retardant adhesive and tape with 3" foil reinforced kraft tape; tape terminations of insulation at fire dampers, flexible connections and ends of ducts to the duct with 3" wide foil reinforced kraft tape. Seal penetrations and punctures in insulation facing with foil reinforced kraft tape and fire-retardant vapor barrier coating.
- B. Mark insulation in such a manner to allow easy inspection after installation.
- C. Apply insulation to standing seams and other projections in ductwork or casings so that at least 1/4" of insulation covers such projections.
- D. Where ductwork is lined, no external ductwork insulation is required.
- E. Where unlined duct and lined duct connect, the external insulation shall overlap lined section a minimum distance of 4".

3.02 APPLICATION OF FIBERGLASS DUCT LINER

- A. Cut duct liner to provide overlapped and compressed longitudinal corner joints. Install liner with black coated surface facing the air stream. Adhere duct liner to the ductwork interior with a 100% coverage of the sheet metal surfaces using a fire-retardant adhesive; adhesive shall be applied by spraying. Coat all exposed leading edges and all transverse joints with fire retardant adhesive. In addition, secure liner using metal pins welded to the duct and speed washers. Spacing of metal pin shall be in accordance with the current edition of SMACNA HVAC Duct Construction Standards – Metal and Flexible.
- B. Protect exposed edges of the lining by 24 gauge galvanized "Z" shapes installed at the edge of the lining, extending over flat side of lining 1/2 from edge.

3.03 APPLICATION OF PREFORMED PIPE INSULATION

- A. Indoor piping:
 - 1. Preformed pipe insulation with all-service jackets shall have all longitudinal joints lapped by a minimum of 2" and sealed with fire-retardant adhesive. Butt joints shall be sealed with 3" wide tape similar to the insulation vapor-barrier jacket and secured with adhesive. All elbows shall be insulated with preformed fitted insulation equal to the thickness specified for the adjacent

pipng insulation. As an alternative, provide fitting covers meeting NFPA/UL 25/50 ratings; stuff all covers with fiberglass insulation having characteristics equal to adjacent pipe insulation.

B. Outdoor piping:

1. Pre-fabricated pipe insulation for exterior water-carrying pipe shall have insulation secured on with copper wire with ends twisted and turned into the insulation. Over the insulation, apply mastic to a minimum 1/4" thickness and draw in, while mastic is wet, glass fiber cloth. Finish with aluminum jacket with waterproof silicone caulk joints. All water-carrying piping subject to freezing weather shall have self-regulating electric heat tracing.

3.04 APPLICATION OF CLOSED-CELL PIPE INSULATION

- A. The insulation shall be installed by the slip-on method; slitting of the insulation is prohibited and shall be cause for rejection. All elbows shall be mitered and all such joints and butt joints shall be tightly made and glued.
- B. All insulation installed outdoors shall be coated with a glossy white, ultraviolet protective coating applied in two coats.

END OF SECTION 23 0700

SECTION 23 3000

DUCTWORK AND AIR DISTRIBUTION

PART 1 – GENERAL

1.01 DUCTWORK

- A. SMACNA Standards referred to hereinafter shall mean standards published by the Sheet Metal and Air Conditioning Contractor's National Association, Inc.
- B. Except where indicated otherwise, duct construction and installation shall conform to the recommendations of the SMACNA manual for Low Pressure Duct Construction Standards. Ductwork shall be constructed and sealed as required for a 2" static pressure rating, Seal Class "C", in the previously referenced standard.
- C. Ductwork as indicated is diagrammatic only and does not show all necessary offsets, hangers, and accessories. All such items required for a completed system shall be furnished by the Contractor.
- D. Sizes shown for lined ductwork are clear inside dimensions and sheet metal dimensions shall be increased to allow for thickness of lining.

1.02 AIR DISTRIBUTION

- A. Select products to provide full coverage of areas served without objectionable noise or draft. Products shall be selected for noise levels not in excess of NC-30. Air distribution products shall be tested and rated in an Air Diffusion Council Certified Laboratory. Unless indicated otherwise, all air distribution products shall be furnished by one manufacturer, who shall catalog a full line of both steel and aluminum air distribution devices.

PART 2 – PRODUCTS

2.01 DUCTWORK

- A. Supply, outside air, return, transfer and restroom exhaust ductwork shall be constructed of galvanized steel sheets of lock form quality per ASTM A653 with a G90 zinc coating (0.90 oz/ft² both sides), unless otherwise shown on the contract documents. Sheets shall be free of pits, blisters, slivers, and ungalvanized spots.
- B. Grease exhaust ductwork shall be constructed of 16 gauge black steel. Ducts shall have longitudinally welded seams and welded or flanged joints and connections to equipment or accessories. Grease exhaust ducts shall slope a minimum of ¼" per foot toward the kitchen hood. 12"x12" clean outs shall be provided at a minimum of 10' intervals in addition to all changes in direction. All grease exhaust duct shall be inspected by means of a "light test" in addition to other tests required by the local authority.

The "light test" shall consist of passing a 100 watt light within the ductwork while inspecting the exterior of the ductwork, welds and flanged joints for any light escaping.

- C. Lab and dish exhaust ductwork shall be constructed of Type 316L stainless steel sheet per ASTM A480 and ASTM A240 with a finished surfaced No. 4 for exposed locations, and No. 2B for concealed locations. Ducts shall have longitudinally welded seams and welded or flanged joints and connections to equipment or accessories.
- D. Angles, rivets, nuts and bolts used in the construction, bracing, or hanging of ducts shall be of the same material as the duct in which installed.
- E. Low pressure ductwork, ductwork that is installed downstream of a low pressure air moving device or terminal unit, shall be fabricated to meet minimum 2" w.g. internal pressure.
- F. Medium pressure ductwork, ductwork that is installed between an air moving device and terminal units, shall be fabricated to meet minimum 4" w.g. internal pressure.
- G. Return air ductwork shall be fabricated to meet minimum 1" w.g. internal pressure.
- H. Lab exhaust ductwork shall be fabricated to meet minimum negative 4" w.g. or the maximum negative pressure the associated exhaust fan is capable of, whichever is lower.
- I. Restroom exhaust and dish exhaust ductwork shall be fabricated to meet minimum negative 2" w.g. or the maximum negative pressure the associated exhaust fan is capable of, whichever is lower.
- J. Exposed sheet metal shall be constructed of "paint grip" type galvanized steel.
- K. Longitudinal seams at corners of rectangular ducts shall be Pittsburgh type or button punch snap lock with locks preferably on the tops and bottoms of ducts, not on the sides.
- L. All duct panels for rectangular ducts over eighteen (18) inches in either height or width shall be cross broken, except as noted and/or specified. Duct panels in which grilles, diffusers or access doors are to be installed shall not be cross broken unless the distance from the edge of the grille, diffuser or access door to the edge of the panel exceeds eighteen (18) inches, in which case this portion of the panel shall be cross broken. The area to which the grille, diffuser or access door is attached shall be left flat. Ducts which are specified to be finished with rigid insulation shall not be cross broken.
- M. Low pressure elbows shall be full radius type or square type with turning vanes. Where elbows have a different size inlet and outlet, turning vanes shall be single thickness type with extensions on the leaving side. Turning vanes shall be installed with vanes parallel to the elbow.
- N. Medium pressure elbows shall be full radius type, no exceptions. Turning vanes are strictly prohibited in medium pressure ductwork.

- O. Tee connections on branch ducts shall be the radius tap in type. Branch take offs from trunk ducts shall be similar to SMACNA Plate 2 5, except that adjustable splitter damper shall be provided at these points or SMACNA Plate 26, Fig. B with adjustable vanes.
- P. Sheetmetal air plenums and partitions shall be constructed of 18 ga. galvanized steel and 1-1/2" x 1-1/2" x 1/4" galvanized steel angles.

2.02 HANGER & SUPPORTS

- A. Hangers and supports for ductwork shall be in accordance with SMACNA standards.
- B. Hangers and supports for hood exhaust system shall consist of either angles under the duct or clips welded to the duct supported by rods secured to the structure.

2.03 FLEXIBLE CONNECTIONS

- A. Flexible connections in rectangular ducts shall be weatherproof minimum 20 oz. Ventglas as manufactured by Vent Fabrics, Inc., Eigin Mfg., or Duro Dyne Corp. Flexible connections shall be not less than six (6) inches long and shall have suitable metal collar frame at each end with allowance of at least two (2) inch slack in fabric to eliminate vibration transmission. Flexible connections exposed to the weather shall be constructed of at least two layers of fabric, and shall be watertight. Provide flexible connections to ductwork at the air handling unit.

2.04 DUCT CLOSURE COLLARS

- A. Provide duct collars where ducts pass through masonry walls and partitions which extend full height to the underside of the structure and shall be fabricated from 22 gauge galvanized steel sheet. Provide duct collar on both sides of walls and partitions, except where registers and grilles are installed. Install flanges tight against the wall. Pack the space between the duct and the wall with fiberglass blanket insulation.

2.05 FLEXIBLE DUCT

- A. Flexible duct shall be insulated, with a flame spread rating not over 25 and a developed smoke rating not over 50. Inner sleeves shall be fiberglass or Tedlar covered spring steel. Insulation shall be no less than 1" thick fiberglass with a vapor barrier jacket.
- B. Flexible duct shall be rated for 6.0 in-w.c.
- C. Flexible duct shall be connected with circumferential compression clamps consisting of either screw driven, slotted stainless steel bands or ratcheted nylon straps.
- D. Flexible duct shall be:
 - 1. Clevaflex, or

2. Genflex, or
3. Flexmaster, or
4. Thermaflex or
5. Wiremold

2.06 SPIN-IN FITTINGS

- A. Spin-in fittings shall consist of a round galvanized sheet metal collar with a groove designed to allow the fitting to screw into a mating hold. Spin-in fittings shall have an extractor and manual balancing damper with a locking quadrant operator. Spin-in fittings on the inlet side of variable volume boxes shall be bell mouth type, without dampers or extractors.
- B. Spin-in fittings shall be mounted with the extractor facing into the airstream. After insulation, a galvanized sheet metal strap shall be screwed to the duct and the fitting to ensure permanent, proper positioning of the fitting.

2.07 AIR DISTRIBUTION DEVICES

- A. Air distribution devices shall be as scheduled on the drawings.
- B. Diffusers shall be complete with pattern adjustment device, straightening vanes and volume control dampers. Diffuser backplate shall transition smoothly from neck size to full face size. Straightening vanes and dampers are not required where diffusers are attached to round flexible ductwork. Internal parts of diffusers shall be secured so that they can be removed and assembled without special tools.
- C. Grilles and registers with borders shall have felt or rubber gaskets cemented to the back face and holding screws not over 18 inches on centers around the perimeter. Grilles passing air through partitions shall be as described for wall return grilles, 1 for each side partition.
- D. Frame types of diffusers and ceiling return grilles shall match ceiling type(s) as indicated on architectural drawings. Diffusers and ceiling return grilles in lay in ceilings shall be sized to lay in a nominal 24"x24" grid opening.
- E. Registers shall be same as grilles with opposed blade damper.
- F. Finish shall be off white baked enamel unless otherwise indicated. Aluminum construction, linear diffusers and bar grilles: exposed surfaces to be clear anodized aluminum, interiors to be flat black.
- G. Air distribution devices shall be:
 1. Anemostat, or
 2. Carnes, or

3. Krueger, or
4. Metalaire, or
5. Price, or
6. Titus, or
7. Tuttle & Bailey

2.08 DUCT AND PLENUM ACCESS DOORS

A. Doors:

1. Double wall construction of not less than 24 gauge galvanized steel sheet, with 1" thick neoprene coated fiberglass insulation between the walls.
2. A continuous hinge on one side and cam latch with striker plate on the other side
3. Height over 12 inches: not less than 2 cam latches with striker plates.

B. Door Frames:

1. Not less than 22 gauge galvanized steel
2. Knock over edges for securing to duct.

C. Door Assembly:

1. Double gasketed to provide seals from the door to the frame and from the frame to duct.

D. Size:

1. To allow proper access to intended device
2. Minimum 12" x 16", except as indicated on the drawings.

2.09 MANUAL DAMPERS AND DAMPER HARDWARE

A. Splitter Dampers:

1. Constructed of not less than 20 gauge galvanized steel sheet.
2. The length of the damper blade shall be the same as the width of the widest duct section at the split, but in no case shall be blade length be less than 12 inches.

B. Manual Volume Control Dampers:

1. Single blade butterfly dampers:
 - a. Use in ducts up to and including 18"x12" size
 - b. Constructed of not less than 16 gauge galvanized steel blade mounted in a galvanized steel frame.
 - c. For rectangular dampers, the top and bottom edges of the blade shall be crimped to stiffen the blade.
 - d. Provide an extended rod to permit installation of a damper regulator.
2. Multi louver dampers:
 - a. Use in ducts larger than 18"x12", in either or both dimensions.
 - b. Opposed blade type, constructed of not less than 16 gauge galvanized steel blades mounted in a galvanized steel channel frame. Blade spacing shall not exceed 6", and the top and bottom edges of the blades shall be crimped to stiffen the blades. Damper blades shall be interconnected by rods and linkages to provide simultaneous operation of all blades. Damper shall be provided with an extended rod to permit installation of a damper regulator.
3. Dampers for outside air intake or relief:
 - a. Edge and jamb seals
 - b. Rated at less than 1% leakage when tested at 2" water.

2.10 FIRE DAMPERS

A. Fire Dampers:

1. Factory fabricated curtain type
2. Constructed and tested in accordance with UL 555
3. Rated for 1-1/2 hour unless noted otherwise
4. Manufacturer: provide instructions for installation conforming to manner in which dampers were approved by UL

B. Frames:

1. Connected to ductwork: "B" frame
2. In transfer openings in wall shall be "A" frame

C. Fusible link rating:

1. In supply ducts: 160°F
2. In return ducts: 135°F
3. In other locations: approximately 50°F above maximum temperature normally encountered with system in operation or shutdown

D. Basis of Design:

1. Ruskin, or
2. Greenheck, or
3. Nailor, or
4. Hart

PART 3 – EXECUTION

3.01 SHEET METAL WORK – GENERAL

- A. Access panels shall be installed on entering side of all turning vanes, fire dampers, control dampers and other locations where cleaning, oiling, inspection or maintenance are required. Access doors shall be located in bottom or side of ducts for ease of access.
- B. Provide supplemental stiffening on ducts and apparatus casings to prevent drumming and to provide a structurally sound assembly.
- C. Interior of ducts shall be smooth with joints caulked or sealed with duct sealer. The entire air system shall be rigid, free from rattles and air noises.
- D. Ductwork connections to unit shall be arranged to avoid restricting access to panels which must be removed for servicing or cleaning of unit.
- E. Paint exposed sheet metal with two coats of paint in a color and type selected by the architect.
- F. Provide auxiliary frames set flush with the plaster line for outlets in plaster.
- G. Install exposed ductwork in finished areas tight to structure.
- H. Ductwork exposed in the space shall be painted with two coats of paint, in a color to be selected by the Interior Designer.
- I. Branch takeoffs to flexible ducts shall be made using spin in fittings. Branch take-offs shall not be located in the following locations: within 5 ft. downstream of an elbow, within 3 ft. of another take-off.

3.02 HANGERS AND SUPPORTS

- A. Duct hangers and support shall be in accordance with Section V (pages 5-1 through and including page 5-13) HANGERS AND SUPPORTS of the referenced SMACNA Standard, except:
 - 1. Hangers shall be spaced no greater than 8'-0" on center
 - 2. For rectangular ducts: with longest dimensions up through 60" hangers shall be the galvanized steel strap type; with longest dimension 61" and larger, hangers shall be trapeze type constructed of galvanized steel angles with round hanger rods. Sizes for strap hangers and trapeze angles and rods shall be based on duct size as scheduled in the SMACNA Standard, Table 5-1 (page 5-8) for strap hangers and Table 5-3 (pages 5-10) for trapeze hangers.
- B. Hangers for ducts suspended directly from the structure shall be screwed or "pop" riveted to the bottom and sides of the duct and secured to the structure by inserts, expansion shield bolts, beam clamps, welding, or bolting. Drive anchors shall not be installed in any location which will weaken the existing building. Install supplementary steel as required to bridge between joists and all supports shall be at joist panel points.

3.03 FLEXIBLE DUCTWORK

3.04 GRILLES, REGISTERS, AND DIFFUSERS

- A. Secure sidewall grilles and registers to duct with galvanized sheet metal screws.
- B. Wall return and relief grilles installed above eye level shall have blades positioned so that inside of duct or the adjacent space will not be visible through the grille.

3.05 FIRE DAMPERS

- A. Provide fire dampers in all duct and air transfer openings of fire rated walls, ceilings, and floors. Install damper in sleeve and install unit in wall using retaining angles. The installation shall be in accordance with the manufacturer's recommendation for complying with UL label.
- B. Duct shall be connected to sleeve using slip type joints on top and bottom and a drive slip on each side so that duct can breakaway leaving damper and sleeve in wall or floor.
- C. After installation prove damper operation by removing link and operating damper.

END OF SECTION 23 3000

SECTION 26 0100

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 INTERPRETATION OF SPECIFICATIONS:

- A. General provisions and requirements apply throughout. Cross references or general provisions may be repeated for convenience or emphasis only.
- B. Interpret the following as indicated:
 - 1. "or equal": "in accordance with the General Conditions", or "an equivalent with respect to style and function".
 - 2. "approved": "approved or accepted by Governing Officials or the authorities having jurisdiction".
 - 3. "provide": "furnish and install, connect, and test, and contract for the performance of same."
 - 4. "wiring": "required conductors or cable and raceway system, including fittings, boxes, connectors, supports, hardware, labeling, and miscellaneous related accessories
 - 5. "work": "materials completely provided," which shall include all activities and services necessary to meet contract requirements, including inspection and replacement as specified of any defective element".
 - 6. "materials": "equipment and/or materials".
 - 7. "(": "shall be/have" Specifications following a colon are criteria which apply to the term preceding the colon.

1.02 SCOPE OF WORK:

- A. Install electrical work covered by the below specifications and approved drawings. Provide material, labor transportation, tools, supervision, etc., necessary to complete the total electrical job. Items not specifically mentioned herein which are obviously necessary to make a complete working installation shall be provided, including any necessary field engineering and/or detail drawings required. Submit drawings for approval as provided for "Shop Drawings".
- B. The work shall consist of, but shall not be limited to, the following systems:
 - 1. Interior and exterior electrical system for lighting, power and secondary service entrance.
 - 2. Empty conduits for telephone and misc. systems.
 - 3. Power connections to equipment specified in specifications and approved drawings.
 - 4. Temporary power as required for the project.
 - 5. New fire alarm system.

1.03 CODES AND FEES:

- A. Work shall be done in accordance with the requirements of the locally adopted edition of the National Electrical Code, NFPA #70 and local and state codes and regulations of utility company providing

service.

- B. Obtain and pay for all permits and inspections required by the building and safety codes, and ordinances, and the rules and regulations of any legal body having jurisdiction.
- C. Electrical items covered by this specification shall be UL labeled and listed for the purpose.

1.04 DRAWINGS:

- A. The drawings indicate the general arrangement of electrical equipment. Review architectural drawings for door swings, cabinets, counters and other built-in equipment; conditions indicated on architectural plans shall govern for this work. Coordinate installation of electrical equipment with the structural and mechanical equipment and access thereto. Coordinate installation of recessed electrical equipment with concealed ductwork and piping, and wall thickness.
- B. Do not scale drawings. Dimensions for layout of equipment shall be obtained from architectural and/or mechanical unless specifically indicated on electrical drawings.
- C. Discrepancies shown on different drawings, between drawings and specifications or between documents and field conditions shall be promptly brought to the attention of the Architect.

1.05 SHOP DRAWINGS:

- A. Submit for review by the architect a complete schedule and data of materials and equipment to be incorporated in the work. Submittals shall be supported by descriptive materials, such as catalog sheets, product data sheets, diagrams, performance curves, and charts published by the manufacturer, to show conformance to specification and drawing requirements, model numbers alone will not be acceptable. Data submitted for review shall contain all information required to indicate compliance with equipment specified. Complete electrical characteristics shall be provided for all equipment. Submittals for lighting fixtures shall include photometric data. The architect reserves the right to require sample of any equipment to be submitted for approval.
- B. Each individual submittal item for materials and equipment shall be marked to show specification section and paragraph number which pertains to the item.
- C. Prior to submitting shop drawings, review the submittal for compliance with the contract documents and place a stamp or other confirmation thereon which states that the submittal complies with contract requirements. Submittals without such verification will be returned without review.
- D. All submittals shall be made at one time. Submittals will not be reviewed until all of the submittals listed below have been received. Submittals shall be made for each of the following items:

Lighting Fixtures
Disconnect Switches
Circuit Breakers

Fire Alarm System Components
Panelboards
Wiring Devices

1.06 RECORD DRAWINGS:

- A. At the time of final inspection, provide three (3) sets of complete data on electrical equipment used in the project and as-built drawings reflecting all field changes. This data shall be in bound form and shall include the following items:
 - 1. Test results required by these specifications.
 - 2. Panelboard shop drawings and circuit directories reflecting all field changes.
 - 3. Data sheets indicating electrical characteristics of all devices and equipment.

1.07 EQUIPMENT CONNECTIONS:

- A. Connect equipment requiring electrical connections under this section of these specifications. Where electrical connections to equipment require specific locations, obtain such locations from shop drawings. Do not scale drawings for location of conduit stub-ups or boxes mounted in wall or floor to serve specific equipment, unless dimensioned on approved electrical drawings.
- B. Electrical circuits to equipment furnished under other sections of these specifications are based on design loads. If actual equipment furnished has loads other than design loads, electrical circuits and protective devices shall be revised to be compatible with equipment furnished at no additional cost to the owner.
- C. Equipment furnished under other divisions of these specifications to be connected under this section of the specifications shall consist of, but not be limited to, the following:
 - a. Electrical equipment for heating, ventilating and air conditioning systems.
- D. Examine other sections of these specifications, where equipment requiring electrical service is specified. Become fully aware of the scope of the work under this section of these specifications requiring electrical service and connections to equipment specified elsewhere.

1.08 MECHANICAL SYSTEMS:

- A. Review plumbing and HVAC drawings and Division 23 of these specifications for mechanical equipment requiring electrical service. Provide service to and make connections to all such mechanical equipment requiring electrical service.
- B. Examine the nameplate data for equipment actually furnished on the project. If equipment has loads other than those indicated, control equipment and feeders shall be adjusted in size accordingly. Such adjustment shall be subject to the approval of the architect.
- C. Regardless of the drawing information, provide a NEMA 5-20R duplex receptacle at each indoor air handling unit above ceiling for use of condensate pump connection. Provide and extend #12 circuit wires from the receptacle to the nearest receptacle below floor.
- D. Regardless of the drawing information, provide minimum of (1) NEMA 5-20R weatherproof covered GFCI duplex receptacle at each outdoor mechanical equipment yard on grade or above roof. Receptacle must be located within 25' from any HVAC equipment. Provide and extend #12 circuit wires from the receptacle to the nearest receptacle.

1.09 COORDINATION:

- A. Coordinate electrical activities with other trades so as to avoid delays, interferences, and any unnecessary work.

1.10 GUARANTEE:

- A. Contractor for Work under this Division shall be fully responsible for determining in advance of purchase that equipment and materials proposed for installation shall fit into the confines of the space indicated, and shall allow sufficient Code clearance for maintenance and service of all electrical equipment including that of other Trades.
- B. No equipment including piping and ductwork shall be installed over or in this Code required clearance space.
- C. The electrical drawings are schematic, and are not intended to show the exact location of conduit, outlets, etc., nor are they intended to show all conduit and conductors which are required and which shall be provided. Exact locations of electrical equipment, outlets, conduit, etc., shall be coordinated with all other Trades so that there will be no interference between mechanical equipment, piping, ducts, etc.
- D. In general, complete circuit work including all conduit and wire is not indicated; however, circuit numbers are indicated for all outlets and equipment. Where circuitry is shown, the installation shall be as indicated. Where complete circuitry is not shown, outlets and equipment shall be connected together with the shortest run allowed by the building structure. Conduit fill and conductors installed in the same raceway shall be derated and be conformed to the NEC requirement. Three (3) phase and single (1) phase circuit homeruns shall not be combined.
- E. All single phase electrical circuit homerun shall have individual phase and neutral conductors regardless whether to combine multiple circuit homerun. Only shared ground conductor is allowed.
- F. The Contractor shall refer to the architectural, structural, and mechanical plans and details for dimensions, and shall fit his work to conform to the details of building construction. The right is reserved to relocate switches, receptacles, ceiling outlets, or other systems outlets a maximum of 10'-0" from its location as shown before it is permanently installed, without incurring additional expense to the Owner. Attention is called to receptacle outlets for coordination with Architectural and Mechanical equipment. Do not install these devices behind such equipment.

PART 2 - PRODUCTS

2.01 MATERIALS:

- A. Materials or equipment specified by manufacturer's name shall be used, unless approval of other manufacturers is listed in addendum to these specifications. Request for approval of substitute materials shall be submitted in writing to the architect at least ten working days prior to bid openings.

- B. Where substitution of materials alters space requirement indicated on the drawings, submit shop drawings indicating proposed layout of space, all equipment to be installed therein, and clearances between equipment.
- C. Material shall be new and shall conform to the applicable standard or standards where such have been established for the particular material in question. Publications and standards of the organization listed below are applicable to materials specified herein.
 - 1. American Society for Testing and Materials (ASTM)
 - 2. Underwriters' Lab (UL)
 - 3. National Electrical Manufacturer Association (NEMA)
 - 4. Insulated Cable Engineers Association (ICEA)
 - 5. Institute of Electrical and Electronic Engineers (IEEE)
 - 6. Edison Electric Institute (EEl)
 - 7. National Fire Protection Association (NFPA)
 - 8. American Wood Preservers Association (AWPA)
 - 9. American National Standards Institute (ANSI)
- D. Material of the same type shall be the product of one manufacturer.
- E. All cost incurred by the acceptance of substitutions shall be borne by the contractor. Proof for substitution shall be by the contractor.

PART 3 - EXECUTION

3.01 WORKMANSHIP:

- A. Work shall be neatly, orderly, and securely installed with conduits, panels, boxes, switches, etc., perpendicular and/or parallel with the principle structural members. Exposed raceways shall be offset where they enter surface mounted equipment. Wiring installed in panels and other enclosures shall be looped and laced and not wadded or bundled.

3.02 TESTS:

- A. At final inspection, a test will be made and the entire system shall be shown to be in proper working order as per these specifications and the approved drawings.
- B. Provide instruments, labor and materials for any essential intermediate and final testing.
- C. Equipment covers (i.e., panelboard trims, motor controls, device plates, and junction box covers) shall be removed, as directed, for inspection of internal wiring. All circuits throughout project shall be energized and shall be tested for operation and equipment connections in compliance with contract requirements. Accessible ceiling shall be removed, as directed, for inspection of equipment installed above ceilings.

3.03 IDENTIFICATION:

- A. Identify each device such as circuit breakers, panelboards, controllers, etc. with enamel or lacquer letters

using machine cut stencils with 1/2" minimum letters, unless otherwise noted.

- B. Identify circuits contained within junction boxes on the cover of all junction boxes.
- C. Provide a white finish, black core Bakelite nameplate for 480/277 volt electrical equipment.
- D. Provide a black finish, white core Bakelite nameplate for 208/120 volt electrical equipment.
- E. Provide a red finish, white core Bakelite nameplate for all emergency electrical equipment.
- F. Bakelite nameplates shall have 5/16" high engraved letters.
- G. Provide engraved laminated job identification nameplate with 3/8" high letters, 4"x8" minimum, centered on main service equipment.
- H. Nameplate shall be same finish at all equipment.
- I. Each distribution type panelboard shall have engraved nameplates for each branch circuit feeder identifying load served.
- J. Each branch circuit panelboard shall be provided with a directory frame on inside of cabinet door. A neat, carefully typewritten, directory card, identifying each branch circuit served by each such panel shall be placed in the frame, under clear plastic cover. Spares shall be noted in pencil.
- K. Nameplates for surface or recessed mounted equipment shall be installed on the exterior of the equipment with screws.
- L. Provide Electrical Safety Arc Flash Warning label conforming to NEC 70E on all electrical panelboards, Transformers, and distribution equipment.
- M. Available fault current and method of electrical equipment protection labels must be clearly identified on the service panel "MDP" as required per NEC 110.24(A) and NEC 110.22.

3.04 CLEANING AND PAINTING:

- A. Oil, dirt, grease, and other foreign materials shall be removed from all raceways, fittings, boxes, panelboard trims, and cabinets to provide a clean surface for painting. Scratched or marred surfaces of lighting fixtures, panelboard and cabinet trims, switchboard, or other equipment enclosures shall be touched up with paint furnished by the equipment manufacturers specifically for that purpose. Painting in general is specified under other sections of the specifications.
- B. Trim covers for flush-mounted panelboards, telephone cabinets, pull boxes, junction boxes and control cabinets shall not be painted unless specifically required by the architect. Where such painting is required, trim covers shall be removed for painting. Under no conditions shall locks, latches or exposed trim clamps be painted.
- C. Unless specifically indicated to the contrary, all painting shall be done under the "Painting" section of

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FEBRUARY 23, 2024

these specifications.

END OF SECTION 26 0100

SECTION 26 0501

ELECTRICAL GENERAL REQUIREMENTS

PART 1 – GENERAL

1.01 DRAWINGS FOR MECHANICAL, PLUMBING, FIRE PROTECTION AND ELECTRICAL WORK

- A. Drawings contain diagrammatic layouts and indicate general arrangement of systems, piping conduit, etc and shall not be scaled.
- B. Prior to installation of material and equipment, review and coordinate work with Architectural and Structural Drawings and other Division work for exact space conditions; where not readily discernable request information from Architect before proceeding.
- C. Check Drawings of all other trades to verify extent of material and equipment to be installed in spaces available and consider layout alternatives so that all requirements can be accommodated.
- D. Maintain maximum headroom at all locations without finished ceilings.
- E. Maintain finished ceiling heights as indicated on Architectural reflected ceiling plans, and building sections and elevation drawings.
- F. Coordinate installations with other trades prior to proceeding to prevent conflict with work of other trades and cooperate in making reasonable modifications in layout as needed.
- G. Where conflicts occur with placement of mechanical and electrical materials as they relate to placement of other building materials, the Architect shall be consulted for assistance in coordination of the available space to accommodate all trades.
- H. Coordinate equipment installation to maintain manufacturer and code required working clearances.

1.02 PRIORITY OF CONSTRUCTION SPACE

- A. Following is the Order of Priority for Construction Space:
 - First: Ductwork.
 - Second: Fire protection piping.
 - Third: Other piping.
 - Fourth: Conduit.

1.03 COORDINATION DRAWINGS

- A. Coordination Drawings are required for all mechanical rooms, electrical rooms, equipment rooms, corridors, horizontal exits from duct shafts, cross overs and any other areas where congestion of work may occur.
- B. The Contractor shall prepare a complete set of background drawings at scale of minimum 1/4" equals 1'-0" with the assistance of the specialty trades.

- a. The construction documents in their original, copies or electronic file form are the Architect's instrument of service and are protected under copyright laws. The reproduction of these documents for use as coordination drawings or shop drawings is prohibited without the Architect's written consent and authorization.
- b. Specialty Trades:
 1. Ductwork
 2. Fire protection piping
 3. Other piping
 4. Electrical
 5. Plumbing piping to include but not limited to sanitary, vent, pressure storm, medical gas (if provided), compressed air, natural gas, etc.
- C. Fabrication shall not start until receipt of completed coordination drawings is acknowledged by the Contractor in writing to the Architect.
- D. Coordination Schedule Drawing:
 - a. The mechanical and plumbing contractor shall furnish to electrical contractor for coordination a schedule drawing providing all the electrical characteristics of all mechanical and plumbing equipment requiring electrical connection. The information provided shall include:
 1. Unit Designation
 2. Voltage
 3. MCA
 4. MOCP/MFS
 5. FLA
 6. Disconnect Requirement
 7. Starter Requirement
 8. Alarm Wiring Requirements
 - b. The coordination schedule drawing, once received by the electrical contractor, shall be reviewed and all pertinent electrical accommodations indicated.
 1. Voltage and phase,
 2. Breaker size,
 3. Wire size / conduit size, and
 4. Disconnect with fuse size.
 - c. Once the coordination schedule is completed forward to the engineers for review and approval.
- E. Conflicts that arise due to the fact that the coordination schedule drawing was not completed shall be the sole responsibility of the contractors. All costs for correction or remedial work shall be done at the contractor's expense. No added cost to the owner will be allowed.

END OF SECTION 26 0501

SECTION 26 0910

OCCUPANCY SENSORS

PART 1 - GENERAL

1.01 SUMMARY

- A. The Occupancy Sensor system shall sense the presence of human activity within the desired space and fully control the "On" / "Off" function of the lights.
- B. Sensing technologies shall be completely passive meaning that they will not emit any radiation that is known to interfere with certain types of hearing aides, or electronic devices such as electronic white board readers. Acceptable programmable shall be Passive Infrared (PIR), and/or PIR/Microphonic Passive Dual Technology (PDT) or Ultrasonic. Microwave based sensing technologies shall not be accepted.
- C. Time Delay settings shall be factory set at 10 minutes, and shall not be field adjusted unless specifically instructed by Architect. This delay selection is based on lamp life vs. energy savings and sensor performance. Automatic adjustments to this delay period by the sensor shall not be permitted.
- D. In high humidity or cold environments, the sensors must be conformably coated and rated for condensing humidity and -40 degree Fahrenheit (and Celsius) operation.
- E. Installer, in accordance with manufacturer's recommendation, shall determine final sensor location. All sensors shall have non-adjustable factory calibrated sensitivity for maximum performance. Time Delay and Photocell field adjustments shall be provided as needed.
- F. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.
- G. All applicable products must be UL Listed or other acceptable national testing organization.

1.02 APPROVED MANUFACTURER AND SUBSTITUTIONS

- A. Acceptable Manufacturers:
 - 1. Hubbell
 - 2. Sensor Switch
 - 3. The Watt Stopper, Inc.
 - 4. Lutron
- B. Substitutions must be submitted no less than 5 days prior to bid date. An AutoCAD drawing of the facility showing coverage patterns and technical data must be provided with substitution request. All substitutions must clearly identify any and all exceptions to the specifications with a detailed explanation as to the exception. If substitution is approved, the contractor shall bear the responsibility of a fully functional system to the owner's and Architect's satisfaction.

1.03 DESIGN / PERFORMANCE REQUIREMENTS

- A. System shall conform to requirements of NFPA 70.
- B. System, components, and installation shall comply with NEMA Guide Publication WD7 – Occupancy Motion Sensors
- C. System shall comply with FCC emission standards specified in part 15, sub-part J for commercial and residential application.
- D. System shall be listed under UL sections 916 and/or 508.

1.04 SUBMITTALS

- A. Submit under provisions of Section 01 30 00 - Administrative Requirements.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Catalog sheets and specifications.
 - 2. Ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
 - 3. Storage and handling requirements and recommendations.
 - 4. Installation instructions.
- C. Shop Drawings: Wiring diagrams for the various components of the System specified including:
 - 1. Composite wiring and/or schematic diagram of each control circuit as proposed to be installed.
 - 2. Show location of all devices, including at minimum sensors, load controllers, and switches/dimmers for each area on reflected ceiling plans.
 - 3. Provide room/area details including products and sequence of operation for each room or area. Illustrate typical acceptable room/area connection topologies.
 - 4. Network riser diagram including floor and building level details. Include network cable specification. Illustrate points of connection to integrated systems. Coordinate integration with mechanical and/or other trades.
- D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.
- E. Closeout Submittals:
 - 1. Project Record Documents: Record actual installed locations and settings for lighting control devices.
 - 2. Operation and Maintenance Manual:
 - a. Include approved Shop Drawings and Product Data.
 - b. Include Sequence of Operation, identifying operation for each room or space.
 - c. Include manufacturer's maintenance information.
 - d. Operation and Maintenance Data: Include detailed information on device programming and setup.
 - 3. Include startup and test reports.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing of centralized and distributed lighting control systems with a minimum of 10 years documented experience.

- B. Installer Qualifications: Company certified by the manufacturer and specializing in installation of networked lighting control products with minimum three years documented experience.
- C. System Components: Demonstrate that individual components have undergone quality control and testing prior to shipping.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation

1.07 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.
- B. Do not install equipment until following conditions can be maintained in spaces to receive equipment:
 - 1. Ambient temperature: 32 to 104 degrees F (0 to 40 degrees C).
 - 2. Relative humidity: Maximum 90 percent, non-condensing.

1.08 WARRANTY

- A. Products Warranty: Manufacturer shall provide a 5 year limited warranty on products within this installation, except where otherwise noted, and consisting of a one for one device replacement.

PART 2 – PRODUCTS

2.01 INFRARED/ULTRASONIC CEILING MOUNTED OCCUPANCY SENSOR

- A. General: Provide a complete and operable multi-technology, passive infrared and ultra-sonic occupancy sensor lighting control system in areas shown on the Drawings. Ceiling mounted sensors shall be designed to turn room lighting "on" immediately upon sensing a room occupant and to turn room lighting "off" if no room occupant is sensed for the entire period of the sensors off time delay, regardless of the shape of the room.
- B. System Components: Occupancy sensor lighting control shall include, but not be limited to, all required sensors, transformers, interface controls and relays, wiring and bypass switches.
- C. System requirements:
 - 1. Sensors shall be self-contained, crystal-controlled ultrasonic motion detectors and infrared motion detectors which provide volumetric coverage without gaps in coverage within the controlled areas.
 - 2. Sensors shall have built-in timing and load control driving circuitry. Housings shall be white impact resistant plastic.
 - 3. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction in coverage shall occur when air conditioning or heating fans are operating or if sensor has turned off due to not sensing motion.

4. All sensors shall have easily accessible, user-adjustable controls for adjusting sensitivity of a sensor to its controlled area, and for adjusting "time to light off" delay. Time delay shall be made settable down to 5 minutes. Sensors must also include a time delay adjustment of one minute or less for sensor operation testing. Adjustment controls shall be recessed in order to limit tampering.
5. An internal bypass "manual-on" switch shall be provided for each sensor for use in the event of sensor failure. When the bypass switch is activated, lighting shall remain constantly "on" and on/off control shall divert to wall switches until sensor is replaced. Override shall be accomplished without the use of unit specific or special tools. The bypass control shall also be recessed to limit tampering.
6. Sensors operating frequency shall be crystal-controlled to within •0.01%, and all ultrasonic transducers must be protected from damage, to provide for long life and consistent and reliable performance.
7. Sensors shall be available with different operating frequencies in order to allow for individual control of adjacent areas, as required.
8. All sensors shall be provided with an indicator light to verify that motion is being detected and that the unit is operating.
9. Sensors shall be able to be wired in parallel to allow coverage of large areas.
10. All ceiling sensors shall have pigtailed plenum cable connectors for installation in plenum ceiling spaces.
11. Wall switches shall be provided with an override capability, for use in an emergency or during lamp changes, which shall be provided by a three position switch which allows selection of positive on, off, and automatic operation override switch to avoid excessive overrides to "on" to defeating energy savings.
12. All ceiling sensors shall be low voltage, have a rugged solid state design, and be designed and manufactured specifically for control of lighting for energy conservation.
13. All sensors shall be manufactured by the same company and shall be aesthetically compatible, i.e., from the same product line or generation of products.
14. Sensors shall be suitable for NEC 725, Class 2 wiring and use plenum cable where approved.
15. Sensors shall be suitable for use with electronic and energy saving ballasts.

2.02 POWER PACKS

- A. Power Packs shall accept 120 or 277 VAC, be plenum rated, and provide class 2 power for up to 14 remote sensors.
- B. Power Pack shall securely mount to junction location through a threaded ½ inch chase nipple. Plastic clips into junction box shall not be accepted. All class 1 wiring shall pass through chase nipple into adjacent junction box without any exposure of wire leads. Note: UL Listing under Energy Management or Industrial Control Equipment automatically meets this requirement, whereas Appliance Control Listing does not meet this safety requirement.

- C. When required by local code, Power Pack must install inside standard electrical enclosure and provide UL recognized support to junction box. All class 1 wiring is to pass through chase nipple into adjacent junction box without any exposure of wire leads.
- D. Power Pack shall incorporate a Class 1 relay and an A/C electronic switching device. The A/C electronic switching device shall make and break the load, while the relay shall carry the current in the On condition. This system shall provide full 20 amp switching of all load types, and be rated for 400,000 cycles.
- E. Power Packs shall be single circuit, or two circuits. Slave Packs may be used to control additional circuits. When two circuit power packs, or slave packs are used, the power packs must be wired directly to circuit breaker. Otherwise, power packs may be wired on the line or load side of the local switch.

PART 3 EXECUTION

3.01 PREPARATION

- A. Do not begin installation until measurements have been verified and work areas have been properly prepared.
- B. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 INSTALLATION

- A. Install system in accordance with the approved system shop drawings and manufacturer's instructions.
- B. It shall be the equipment manufacturers/contractors' responsibility to provide the quantity of motion sensors required for complete and proper volumetric coverage without gaps within the range of coverage of controlled areas. Rooms shall have 100% volumetric coverage to completely cover the controlled area to accommodate all occupancy habits of single or multiple occupants at any location within the room. The locations and quantities of sensors shown on the Drawings are diagrammatic and indicate only rooms which are to be provided with sensors. The equipment manufacturer/ contractor shall provide additional sensors if required to properly and completely cover the respective room. Proper judgment must be exercised in executing the work so as to ensure the best possible installation in the available space and to overcome local difficulties due to space limitations or interference of structural components. Where conflicts occur additional sensor shall be provided.
- C. All line voltage connections shall be tagged to indicate circuit and switched legs.
- D. Test all devices to ensure proper communication.
- E. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings. Adjust time delay so that controlled area remains lighted while occupied.
- F. Provide written or computer-generated documentation on the configuration of the system including room by room description including:

- i. Sensor parameters, time delays, sensitivities, and daylighting setpoints.
 - ii. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)
 - iii. Load Parameters (e.g. blink warning, etc.)
- G. Post start-up tuning - Adjust sensor time delays and sensitivities to meet the Owner's requirements 30 days from beneficial occupancy. Provide a detailed report to the Architect / Owner of post start-up activity.
- H. Tighten all panel Class I conductors from both circuit breaker and to loads to torque ratings as marked on enclosure UL label.
- I. All Class II cabling shall enter enclosures from within low-voltage wiring areas and shall remain within those areas. No Class I conductors shall enter a low-voltage area.
- J. Run separate neutrals for any phase dimmed branch load circuit. Different types of dimming loads shall have separate neutral.
- K. Verify all non-panel-based lighting loads to be free from short circuits prior to connection to room controllers.

3.03 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing. Notify Architect and Manufacturer in writing a minimum of 3 weeks prior to system start-up and testing.
- B. Tests and Inspections: Manufacturer's service representative shall perform the following inspections and prepare reports.
 - i. Verify Class I and II wiring connections are terminated properly by validating system performance.
 - ii. Set IP addresses and other network settings of system front end hardware per facilities IT instructions.
 - iii. Verify / complete task programming for all switches, dimmers, time clocks, and sensors.
 - iv. Verify that the control of each space complies with the Sequence of Operation.
 - v. Correct any system issues and retest..
- C. Provide a report in table format with drawings, or using a software file that can be opened in the manufacturer's system software including each room or space that has lighting control installed. Indicate the following:
 - i. Date of test or inspection.
 - ii. Loads per space, or Fixture Address identification.
 - iii. Quantity and Type of each device installed
 - iv. Reports providing each device's settings.

3.05 DEMONSTRATION AND TRAINING

- D. Before Substantial Completion, arrange and provide a one-day Owner instruction period to designated Owner personnel. Set-up, starting of the lighting control system and Owner instruction includes:
 - i. Confirmation of entire system operation and communication to each device.

- ii. Confirmation of operation of individual relays, switches, and sensors.
- iii. Confirmation of system Programming, photocell settings, override settings, etc.
- iv. Provide training to cover installation, programming, operation, and troubleshooting of the lighting control system.

END OF SECTION 26 0910

SECTION 261000
BASIC MATERIALS AND METHODS

PART 1 - GENERAL

1.01 GENERAL

- A. Provide complete conduit system including boxes, fittings and supports. Leave empty conduits with fiber polyline pull cord. Conceal conduits except in unfinished spaces such as areas without ceilings. Type MC cable shall be used for wiring concealed in walls serving receptacles and switches. The MC wiring shall be extended from junction boxes mounted above the ceilings.

1.02 RACEWAYS:

- A. Install conduits per the below requirements:
1. Intermediate Metal Conduit (IMC): ferrous galvanized conduit.
Comply with Article #342 of the National Electrical Code.
 2. Rigid steel conduit: ferrous galvanized conduit.
Comply with Article #344 of the National Electrical Code.
 3. Electrical Metallic Tubing (EMT): ferrous galvanized conduit.
Comply with Article #358 of the National Electrical Code.
 4. Liquid tight flexible metal conduit.
Comply with Article #350 of the National Electrical Code.
 5. Flexible metal conduit.
Comply with Article #348 of the National Electrical Code.
 6. Rigid nonmetallic conduit: Polyvinyl Chloride Schedule 40 (PVC) conduit.
Comply with Article #352 of the National Electrical Code.
- B. Coordinate raceways with the mechanical ductwork and plumbing work installed in the job,

1.03 OUTLETS:

- A. Location of Outlets: located diagrammatically on the drawings. Refer to the architectural and mechanical plans for the exact location of outlets. Locate outlets so that they will be symmetrical with architectural details. Locate power outlets to serve the equipment. The location of any outlet may be moved ten feet before it has been installed without additional expense to the owner.

1.04 SIGNS:

- A. Provide identification to the following electrical equipment with permanently attached phenolic plates with 1/4" white engraved lettering on the face of each, attached with two sheet metal screws. Plates must use color code identification. Identification plates also, shall identify the panel name and branch of the electrical system.

Main switchboard and individual devices installed therein:
Panelboards
Safety Switches and Disconnects

Shunt Trip Pushbutton
Main Service Disconnects

PART 2 - PRODUCTS

2.01 CONDUCTORS:

- A. Conductors: Copper, 600 volt type THHN/THWN insulation except where noted on drawings. Conductors installed where fixtures are used as raceway shall be 90oC Type THHN or XHHN.
- B. Branch circuits: minimum #12 AWG solid copper except for motor leads, which shall be a minimum #12 AWG stranded copper, unless otherwise noted on drawings.
- C. Color code three phase system branch circuit and feeder conductors: No. 8 AWG and smaller as follows:

1. 208Y/120 volt

- a. Phase A: Black
- A. Phase B: Red
- B. Phase C: Blue
- C. Neutral: White
- D. Ground: Green

2. 480Y/277 Volt

- a. Phase A: Brown
- B. Phase B: Orange
- C. Phase C: Yellow
- D. Neutral: Gray

- D. MC Cable: Copper conductors with THHN insulation, steel armor, green grounding conductor, 600 volt.

2.02 PULLBOXES:

- A. Pull boxes: code gauge galvanized sheet steel, per Article 314 of the National Electrical Code, for the number, size and position of conduits entering the box, size of box and maximum number of conductors in a box.

2.03 OUTLET BOXES:

- A. Provide outlet boxes for each lighting fixture and for each device. Boxes shall not be smaller than specifically indicated herein and shall be larger if required by Article 314 of the National Electrical Code for the number and size of conductors installed. Where lighting fixtures are installed in continuous rows, only one outlet box shall be required unless otherwise noted on drawings.

2.04 RECEPTACLES AND WALL SWITCHES:

- A. Receptacles and wall switches: the type and size indicated on the drawings. Equal by Bryant, Eagle or P & S.
 - 1. Switches shall be 20 Amp 120/277 volt specification grade. Number of poles: as indicated on drawings.
 - 2. Duplex outlets shall be 20 Amp 125 volt AC 3 wire specification grade straight blade.
 - 3. Single outlets shall be 20 Amp 125 volt AC 3 wire specifications grade straight blade.
- B. Device plates: one piece single or multi-gang type selected to match the specific device or combination of devices. Devices flush mounted in exposed masonry construction shall be jumbo type. Device plates for surface mounted devices shall be used with the type of outlet or outlet box in which the device is mounted. Provide devices installed in areas exposed to the weather with a weatherproof device plate. Cover plates shall be metal unless indicated differently on contract documents.
- C. Finishes: Finish of Switch handles and receptacles shall be color per the architect/interior designer.

PART 3 - EXECUTION

3.01 GENERAL

- A. Type MC cable shall be used for all branch circuit wiring in inaccessible areas and above accessible ceilings. EMT steel conduit shall be used for all branch circuit homeruns and feeders.
- B. MC cable shall be run from homerun junction boxes to devices, switches, and light fixtures in inaccessible areas.
- C. Rigid steel conduit shall be used for raceways run exposed on exterior of building, in slabs on grade, or in poured concrete walls or columns.
- D. Non-Metallic Conduit shall be used for raceways run underground and where non-metallic conduit or plastic conduit (PVC) is specified herein or shown on the drawings.
- E. All conduit and MC cable shall be run concealed unless otherwise directed or indicated on the drawings. Concealed conduit shall be run in walls and above ceilings.
- F. Conduit shall be run below grade or in the slab where indicated.
- G. MC cable shall not be installed exposed.

3.02 RACEWAYS

- A. Install exposed conduits parallel or at right angles to existing walls, ceilings, and structural members. Support exposed conduits at not more than ten foot intervals and within three feet of outlets, junction

boxes, cabinets and fittings. Support individual runs of conduits by one hole conduit straps. Support groups of conduits on 1/2" x 1/2" fourteen gauge channel. Kindorf, Unistrut, or Powers, suspended from structure with 3/8" threaded steel rods with spring steel conduit supporters. Attach rods to structure with swivel type clamps. Support individual runs of exposed conduits attached to structural steel by beam clamps. Where conduits must pass through structural members obtain approval of architect with respect to location and size of hole prior to drilling.

- B. Support concealed branch circuit conduits at intervals not exceeding ten feet and within three feet of each outlet, junction box, cabinet or fitting. Attach individual branch circuit conduits to structural steel members with spring steel type conduit clips and to non-metallic structural members with one hole conduit straps. Where branch circuit conduits must be suspended below structure, support conduits by trapeze type support of exposed conduits. Attach concealed feeder conduits larger than one inch trade diameter above ceiling to structure on intervals not exceeding twelve feet with conduit beam clamps, one hole conduit straps or trapeze type support in accordance with conditions encountered. Do not attach conduits to channels of ceiling suspension system or suspension wires.
- C. Attach conduit support device to structure with wood screws on wood, toggle bolts on hollow masonry, lead shield on solid masonry and machine bolts, clamps, or spring steel clips on steel. Nails are not acceptable.
- D. Attach rigid conduit to sheet metal enclosures with two bonding type lock nuts and insulated bushing. EMT connectors and couplings shall be steel set screw type. Connectors shall be of the insulated throat type. Terminate rigid conduit stub ups not attached to enclosure with steel insulated throat, grounding type bushing. Connectors and couplings shall be approved for the purpose.
- E. Provide expansion fittings in feeder conduits where conduits pass through building expansion joints. Conduits penetrating rated fire walls or rated fire floors shall be installed with devices to maintain the fire rating of the wall or floor penetrated. Contractor shall caulk holes on both sides of smoke walls where conduits penetrate.
- F. Support conduit on the roof by clamping to premanufactured polyethylene blocks with integral standard strut channel.
- G. Protect conduits against dirt, plaster, and foreign debris with conduit plugs. Plugs shall remain in place until masonry work is complete.
- H. Seal conduits entering buildings from below grade with fiber and insulating electrical putty to prevent entrance of moisture.
- I. Use conduit seals where noted on drawings and per Article #300-5 and #300-7 of the National Electrical Code. Crouse-Hinds Type "EYS", Appleton Type "EYF" or O.Z. Gedney Type "EY" or "EYA".
- J. Flexible conduit shall comply with the above and below specifications.
 - 1. Use flexible conduit connection to vibrating equipment, electric duct heaters, unit heaters and rotating machinery, and for connection from junction box to corresponding recessed lighting fixture.

2. Flexible liquidtight conduit connecting motors, duct heaters, unit heaters and other electrical equipment subject to vibration shall not exceed eighteen inches in length.
 3. Flexible metal conduit from outlet box to recessed lighting fixture shall not exceed six feet in length.
 4. Flexible conduit used for other than connections to lighting fixtures shall not be less than one-half inch trade size and in no case shall flexible conduit size be less than permitted by the National Electrical Code for the number and size of conductors to be installed therein. Three-eighths inch flexible conduit may be used for connection to lighting fixtures providing conduit fill requirements of National Electrical Code are not exceeded.
 5. Maintain ground continuity through flexible conduit with green equipment grounding conductor; do not use flexible conduit for ground continuity.
 6. When exposed to weather, when specifically indicated, or when installed in areas subject to moisture, flexible conduit shall be liquidtight type.
 7. Connectors for flexible conduit shall be the insulated throat type. When used with liquid type flexible conduit, connectors shall be of the screw-in ground cone type.
- K. All raceways installed in the service shop shall be concealed behind walls.
- L. If a conduit is required to be installed exposed due to owner change's after construction of wall and cavity is not accessible, explosion proof fittings shall be installed on both ends of exposed raceway stub-ups from underground in the service shop area conforming to National Electrical Code, Article 511. Continuous exposed GRC raceway unbroken exiting shop floor to 30" AFF before any coupling or connector to box may be exempted conforming to 511.3.
- M. Explosion proof fittings shall be used for underground electrical raceway system in the service shop areas conforming to National Electrical Code, Article 511.
- N. If a conduit is required to be installed exposed due to owner change's after construction of wall and cavity is not accessible, surface electrical raceway system in the service shop areas installed below 10'-0" above finished floor shall be rigid galvanized raceway system.
- O. All feeders in rigid conduit 3/4" and larger or having conductors #6 and larger terminating in switchboards, panelboards, pull boxes, tap boxes and similar boxes shall have nylon insulated grounding bushings.
- P. Conduits below service shop areas shall be IMC or threaded rigid metal conduit per 511.8.
- Q. Conduits and junction boxes in service shops, service drives and compressor rooms shall not be installed within 18" of the ceiling.
- 3.03 PULL OR JUNCTION BOXES:
- A. Provide pull boxes where specifically indicated and where required to facilitate the installation of conductors. Install pull boxes exposed only in unfinished spaces, unless otherwise specifically indicated, and install to be fully accessible.

- B. Where pull boxes are installed in finished spaces, boxes shall be flush mounted, with trim, hinged door and flush latch and lock to match panel trim for flush mounted electrical panel. Surface mounted boxes shall be Type "FD" with blank covers.
- C. Pull boxes required for horizontal feeders containing more than one feeder shall be provided with reinforced flange and removable 12 gauge $\frac{1}{2}$ " x $\frac{1}{2}$ " galvanized channel for support of conductors. Wood supports within pull boxes are not acceptable.
- D. Splices shall not be permitted in pull boxes except when specifically approved in writing by the architect or where specifically shown on the drawings. Where splices are permitted, splices shall be made with splicing sleeves attached to conductors with hydraulic crimping tool. Split bolt connectors are not acceptable for splices within pull boxes.
- E. Feeders within pull boxes shall be individually laced with nylon tie straps of the type with enlarged tab to permit identification of each feeder within pull box.
- F. Minimum pull or junction box size shall be 4 $\frac{11}{16}$ " square by 2 $\frac{1}{8}$ " deep.
- G. Mark on the coverplate of the junction box the circuit numbers of the circuits in that box. Marking may be made with permanent markers, in legible writing.

3.04 OUTLET BOXES:

- A. Outlet boxes for surface mounted and pendant mounted lighting fixtures shall be 4" octagon boxes, 1- $\frac{1}{2}$ " deep.
- B. Outlet boxes for flush mounted lighting fixtures shall be 4" square boxes 2 $\frac{1}{8}$ " deep, with blank cover installed adjacent to fixture. Box shall be accessible when fixture is removed. Connection to fixture shall be with flexible conduit and fixture wire.
- C. Outlet boxes for switches, receptacles and wall mounted junction boxes shall be 4" square boxes 2- $\frac{1}{2}$ " deep with square edge cover. Where only one conduit enters box, 3 $\frac{1}{2}$ " deep single gang switch box may be used. Outlet boxes shall be set to within $\frac{1}{8}$ " of finished wall.
- D. Outlet boxes for switches and receptacles in exposed wiring system shall be "FD" boxes with matching device plate.
- E. Outlet boxes for individual switches, and receptacles flush mounted in exposed concrete block shall be single gang masonry boxes 3 $\frac{1}{2}$ " deep, set to within $\frac{1}{8}$ " of finished block.
- F. Where special purpose device specified requires larger outlet box than specified herein, provide outlet box suitable for specific device. These outlet boxes shall be of the same type as specified herein for the specific installation required.
- G. Where low voltage device is to be installed in common outlet box with line voltage device, provide metal barrier within outlet box to establish two separate compartments.

- H. Outlet boxes used for support of surface mounted incandescent lighting fixtures shall be provided with fixture stud. Boxes shall be supported by light weight channel spanning between and attached to main ceiling support member. Attach channel to ceiling support members with galvanized tie wire or nylon tie straps.
- I. Outlet boxes shall not be used for support of fluorescent fixtures, boxes shall be used only as junction boxes.
- J. Outlet boxes for use with communication, alarm and signal systems are specified with specific systems.
- K. Review architectural and interior drawings for areas where outlets occur within specific architectural or structural features and install outlets as shown on architectural drawings, or, if not shown, accurately center and align boxes within the architectural feature or detail.
- L. Unless otherwise indicated or specified, switches and receptacles shall be mounted with middle of device, the distances indicated herein, above the finished floor except where finished walls are exposed concrete block, in which case height shall be adjusted to allow outlet box for device to be mounted at block joint. Review architectural drawings for any device requiring specific location. Mounting heights for devices shall be as follows (unless noted otherwise):
 - A. Wall Switches: 46" (42" if above counter or other obstruction)
 - B. Wall Receptacles: 18"
 - C. Receptacles above counter tops: 4" above back splash with major axis horizontal
 - D. Telephone and Computer Outlets: 18"
- M. Devices shall be mounted within outlet boxes to allow device plates to be in contact with wall on sides. Devices shall be accurately aligned with major axis of device parallel to adjacent predominate building feature.
- N. Wall switches shall be installed on the strike side of doors.
- O. Unless otherwise noted on Drawings, wall outlet boxes in the service shop area shall be installed at 44" AFF. Service shop is classified as any place or location that vehicle will be serviced without ventilation provided, including but not limited to Service Bays, Details, Carwash Tunnel, Fluid/Compressor Rooms, etc. that must conform to NEC 511.

3.05 CONDUCTORS:

- A. Feeder and branch circuit conductors No. 6 AWG and larger shall be phase identified in each accessible enclosure by 1" wide plastic tape attached to conductors in a readily visible location. Tape colors shall match color requirements specified herein.
- B. Branch circuit conductors shall be connected as indicated on the drawings. Common neutrals and ground wires may be pulled in conduits where only opposite phase conductors are run. Conduits shall have a ground wire pulled and shall comply with Article 250 of the National Electrical Code.

- C. Conductors within enclosures, i.e., panels, terminal cabinets, control cabinets shall be grouped and laced with nylon tie straps. Conductors within pull boxes shall be grouped and identified with nylon tie straps with circuit identification tag.
- D. Splices in conductors shall be made only within junction boxes, wiring troughs and other enclosures as permitted by the National Electrical Code. Do not splice conductors in panelboards, safety switches, or motor control enclosures. Splices in conductors No. 10 AWG or smaller shall be made with Scotchlok insulated spring connectors, Ideal wing nuts, or Ideal steel crimp connectors with wrap-cap insulating caps. Splices in conductors No. 8 AWG and larger shall be made with split bolt connectors taped with No. 88 plastic electrical tape or Ideal Type GP or GT tap connectors and insulating cover unless splices are specifically indicated to be made with crimping sleeve applied to conductors with hydraulic operated crimping tool.
- E. Conductors used only for 120 volt control wiring systems shall be minimum No. 14 AWG stranded type MTW 600 volt insulation. Control conductors to be J.I.C. color coded. Where control conductors terminate on terminal strip, make termination with lug applied to conductor with crimping tool.
- F. Maintain phase rotation established at service equipment throughout entire project.
- G. Pull Wires: 500# minimum test continuous fiber polyline.
- H. All conductors shall be copper. Aluminum conductors are not permitted.

END OF SECTION 26 1000

SECTION 26 4000

ELECTRICAL DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.01 GENERAL:

- A. Provide electrical distribution equipment as specified, scheduled or indicated on the approved drawing and these specifications.

PART 2 - PRODUCTS

2.01 PANELBOARDS:

- A. Panelboards: bolt-in circuit breaker type with a rated main breaker or rated main lugs only as noted on drawings. Interrupting capacity as shown on plans. Multiple breaker shall be common trip type only. Provide GFCI (Ground Fault Circuit Interrupter) breakers where indicated. Panels shall be fully rated, no series ratings are acceptable.
- B. End and side gutter shall have minimum clearance as required by the NEC. Depth shall be 5 3/4" minimum.
- C. Approved manufacturers are: Square D, Cutler Hammer, and ABB-General Electric.
- D. Main lugs of panels or main circuit breaker shall be UL listed for copper or aluminum conductors. Lugs shall be of the proper range for feeder conductors indicated on the drawings.
- E. Panels throughout project shall be keyed alike.
- F. Provide circuit breakers with trip rating class and poles as indicated on the drawings. Class indicated is designation according to Federal Specification W-C-375b and indicates the frame size and interrupting rating required. Operation of multiple breakers shall be by single handle; tie handles are not acceptable.
- G. Circuit breakers used for the control of discharge lighting shall be designated for the purpose and bear the marking "SWD".

2.02 DISCONNECT SWITCHES:

- A. Provide Heavy Duty, Load Break type Fusible or Non-Fusible disconnect switches for all motors located out of sight of motor controller and where specifically indicated on the drawings. Disconnect switches shall disconnect all underground conductors. When exposed to weather, enclosure shall be NEMA 3R (Raintight); otherwise, enclosure shall be NEMA-1. Switches shall be installed to be fully accessible in accordance with Article 110-26 of the National Electrical Code.

- B. Disconnect switches for single phase motors shall be horsepower rated, motor switches without overload protection, voltage rating as per motor nameplate voltage or greater.
- C. Fusible disconnect switch shall disconnect all ungrounded conductors and shall be supplied with the proper sized fuse clips and fuses. Fuse size over frame size will be noted on drawings. Fuses shall be current limiting low peak dual element Type RK-1 fuses.
- D. Disconnect switches shall be Square D, Siemens - ITE or Cutler Hammer. All disconnect switches shall be identified in accordance with the "Identification" section of these specifications and Article 110-22 of the National Electrical Code.

2.03 SURGE PROTECTIVE DEVICE (SPD):

- A. SPD shall be mounted within the panelboard enclosure by the panelboard manufacturer. SPD mounted in separate enclosures will not be accepted.
- B. The SPD provided shall meet or exceed the following single pulse surge current capacity requirements:
 - 1. Line to Ground 100kA
 - 2. Line to Neutral 100kA
 - 3. Neutral to Ground 100kA

2.04 BACKBOARDS:

- A. Provide backboards for all panels and power distribution equipment and as required by the local inspectors.
- B. Backboards: be made of 3/4" FRP grade plywood, supported by an angle iron frame painted light gray.

PART 3 - EXECUTION

3.01 MANUFACTURERS' RECOMMENDATIONS:

- A. Install electrical distribution equipment in accordance with the manufacturer's recommendations and these specifications.
- B. Where ground-fault protection of equipment is provided, performance testing by means of primary current injection shall be conducted and documented by qualified persons in accordance with NEC 230.95 (C). Electrical contractor shall be prepared to provide "proof of test" document from qualified person having performed the test, should the AHJ request.

3.02 PANELBOARDS:

- A. Identify each circuit protective device with numeral designation, cross referenced with typewritten circuit directory on interior of panel door. Include a copy of each panel directory, reflecting all field changes, in the bound data provided at the time of final inspection.

- B. Circuit breakers shall be numbered and connected to panel bus in the following sequence: Circuit 1, Phase A; Circuit 3, Phase B; Circuit 5, Phase C. Where bus diagrams are indicated on the drawings, breakers shall be positioned in panel to conform to diagrams; otherwise, single pole breakers shall occupy top positions in panel with blank spaces in lower positions and two and three pole breakers in between.
- C. Conductors within panels shall be grouped and laced with nylon tie straps. Splicing of conductors within panels is not acceptable. Only one conductor shall be installed under terminal of individual circuit breaker.

3.03 FLOOR MOUNTED EQUIPMENT

- A. Provide a 4" high concrete housekeeping pad beneath all floor mounted electrical equipment. This pad shall extend 6" beyond the electrical equipment in all directions. All exterior edges on the concrete pad shall be beveled.
- B. Enclosure shall be secured to floor by a minimum of four (4) anchoring devices for equipment up to 24" deep and 36" wide and by a minimum of six (6) anchoring devices for larger equipment. Refer to manufacturer recommendation for anchoring.

END OF SECTION 26 4000

SECTION 264500

GROUNDING

PART 1 - GENERAL

1.01 GROUNDING:

- A. Grounding shall comply with Article 250 of the National Electrical Code, state and local codes, and the requirements of the utility company serving the site.
- B. The building electrical system shall be a grounded wye supplemented with equipment grounding systems. Non-current carrying parts of the electrical system i.e., raceways, equipment enclosures and frames, junction and outlet boxes, machine frames and other conductive items in close proximity with electrical circuits, shall be grounded to provide a low impedance path for potential ground faults.

PART 2 - PRODUCTS:

2.01 MATERIALS:

- A. Ground rods shall be 3/4" copperweld sectional rods 8'-0" in length. Top of the ground rod shall be twelve (12) inches below finished grade. Connection to the ground rod shall be made by chemical weld process. Resistance to ground shall not exceed twenty-five (25) ohms.
- B. Grounding conductor: copper sized in accordance with Articles 250-66 of the National Electrical Code.

PART 3 - GROUNDING:

3.01 GROUNDING:

- A. Ground the neutral conductor of the building electrical system to the metal cold water system and to the ground rod system. Make connections with ground clamp. Install conductor in PVC conduit to point of ground connection. Make connection to the metal cold water pipe of the main metal water line entering the building or the first metal portion of the water line within the building. Install jumper around water meter by approved methods.
- B. Provide each panelboard with a copper equipment grounding bar brazed or riveted to the associated enclosures or cabinet and an insulated neutral bar. Braze the related feeder and branch circuit grounding conductors to the grounding bar or connected with pressure connector. The initial panelboard of each separate system served from a system source or dry type transformer shall have an insulated neutral bar interconnected with the grounding bar to establish the system common ground point.

- C. Ground motors by drilling and tapping the bottom of the motor junction box and attaching the conductor to the box with a round head bolt used for no other purpose. Conductor attachment shall be through the use of a lug attached to conductor with crimping tool.
- D. Install a grounding conductor in power and lighting conduit installations. All circuit grounding conductors shall be sized per Article 250 of the National Electrical Code.
- E. Upon completion of the ground rod installation, test the system by the “fall of potential” measuring method using a ground resistance test meter and two auxiliary electrodes driven into the earth, interconnected through the meter with the ground rod installation being tested. Placement of the auxiliary electrodes shall be in accordance with operating instructions of the test meter, but in no case shall be placed within the effective resistance area of the system being tested. The effective resistance area shall be considered twice the ground rod length of the ground rod(s) driven. The test shall not be taken within forty-eight (48) hours of rainfall and shall include the data tested and the lowest reading recorded. Test results shall be forwarded, in writing, immediately to the engineer.

END OF SECTION 26 4500

SECTION 26 5000

LIGHTING FIXTURES

PART 1 - GENERAL

1.01 GENERAL

- A. Select lighting fixtures from those fixtures included in the fixture schedule. Request for fixtures other than those listed in the fixtures schedule must be submitted in writing at least ten working days prior to opening of bids to the architect with copy to engineer.
- B. Request for fixture substitution must be accompanied by construction specifications, photometric test data including foot lambert reading, and complete dimensions. Data for exterior lighting luminaires must also contain isocandle curves and average lumen distribution data.
- C. Select fixtures from the fixture schedule not only by catalog number, but with consideration to mounting, number and types of lamps, and reference notes as contained in the fixture schedule and/or drawings.
- D. Lamps shall be provided for fixtures in accordance with fixture schedule and/or manufacturer's recommendations.
- E. Plaster frames shall be provided for recessed fixtures as required when installed into gyp ceilings.
- F. Verify fixture numbers, before placing order, to assure that fixtures will be furnished with proper frames, fitting, and devices for installation in the ceiling system which is to be installed.

PART 2 - PRODUCTS

2.01 BALLASTS:

- A. Ballasts provided with fixtures shall be ETL-CBM approved, high power factor, with UL label. Ballasts for rapid start lamps shall be Premium Class P. Ballasts for T-8 lamps shall be electronic. Ballasts shall be for the voltage of the circuit to which connected. Ballasts shall be provided for fluorescent and high intensity discharge lamps. Ballasts shall not be less than or equal to 10% THD.
- B. Fluorescent fixtures exposed to outside temperatures shall be provided with 0 degree ballasts.

2.02 LAMPS

- A. Provide all lamps for lights on this project. All lamps to be 3500K unless otherwise noted.
- B. Lamps shall be Philips, Sylvania or ABB/General Electric.

2.03 LED SOURCES

- A. LED light sources shall be rated for operation between -40 degrees Celsius and 50 degree Celsius.
- B. Provide CCT (Correlated Color Temperature) as specified in fixture schedule included within contract documents.
- C. Fixture CRI (Color Rendering Index) shall meet or exceed that specified in fixture schedule included within contract documents. Where no CRI is scheduled, CRI shall be 80 or greater.

2.04 LED DRIVERS

- A. All drivers shall have an operating efficiency meeting or exceeding that of 85%.
- B. All drivers shall have a minimum starting temperature of at least -40 degrees Celsius.
- C. All drivers shall have a voltage input and phase of that specified in fixture schedule included within contract documents.
- D. All drivers shall be rated for operation at 60Hz.
- E. All drivers shall have a power factor greater than that of 0.9.
- F. All drivers shall have a THD (Total Harmonic Distortion) not exceeding that of 20%.

2.05 LED FIXTURES

- A. LED fixtures shall come equipped with integral heat dissipation systems.
- B. LED fixtures shall have a minimum service life of 55,000 hours at ambient 25 degrees Celsius operating temperature.
- C. LED fixtures shall have LED sources and drivers that are accessible from the exposed side of the fixture and do not require removal of fixture for LED source and/or driver repair/replacement.

PART 3 - EXECUTION

3.01 GENERAL:

- A. Install lighting fixtures in accordance with the manufacturer's recommendations, as herein specified, or as indicated on the drawings.
- B. Hang fluorescent fixtures suspended from ceiling joist by means of fixture chain and approved light support supplied by light manufacturer. Two supports are required for each four (4) foot fixture.
- C. Surface and wall mounted emergency lights are to be hung as per approved manufacturers methods for each light.
- D. Ceiling grids shall not be used for the sole support of recessed, lay-in type fixtures. Each lay-in type, recessed fixture shall be independently supported from the structure by two #10 hanger wires installed

on diagonal corners of the fixture.

- E. Provide integral test switch as part of the fixture for lighting fixtures with emergency battery units. Do not use remote test switches.
- F. Provide U.L. "FR" Label for recessed lighting fixtures mounted in fire rated ceilings. Construct a fire rated enclosure around the fixture housings using fire rated acoustical ceiling tile.

END OF SECTION 26 5000

SECTION 26 7200

FIRE ALARM SYSTEM

PART 1 - GENERAL

1.01 SCOPE

- A. Provide all labor, material, tools, and equipment necessary for and incidental to the installation and testing of a fully supervised manual and automatic addressable fire alarm system as described herein.
- B. The fire alarm system shall be the standard design of a single supplier. Components used shall be cross-listed for use with the system as selected by the Owner. Components shall be supplied by the same Manufacturer.

1.02 REFERENCES

- A. Fire alarm system and components shall conform to the following:
 - 1. NFPA 70
 - 2. NFPA 72
 - 3. NFPA 72E
 - 4. NFPA 72G
 - 5. NFPA 72H
 - 6. NFPA 241
 - 7. UL 164
 - 8. UL 268
- B. Equipment shall be listed as power limited by Underwriters Laboratories, Inc. or approved by Factory Mutual. The fire alarm system in its entirety shall be in compliance with applicable fire and electrical codes. Accessory components as required shall be catalogued by the Manufacturer and UL listed to operate with the Manufacturer's control panel and other fire alarm equipment.

1.03 SUBMITTALS

- A. Submit the following Shop Drawings and Submittals listed below for review by the Architect. Submittals shall indicate conformance with the hereinbefore listed References, or provide certification of meeting those requirements.
 - 1. Peripheral Devices-Initiating
 - 2. Peripheral Devices-Signaling
 - 3. Peripheral Devices-Auxiliary
 - 4. Batteries with Calculations
 - 5. Point-to-point CAD drawings
- B. Submit fire alarm equipment supplier qualifications submitted indicating years in business, service policies, warranty definitions, and a list of similar installations. No system shall be considered unless there is a locally staffed office offering parts and service within a 50 mile radius of the job site.

- C. Contractor qualifications shall be supplied indicating years in business and prior experience with installations that include the type of equipment that is to be supplied.

PART 2 - PRODUCTS

2.01 SYSTEM DESIGN

- A. Provide a fully operational and functional addressable fire detection system. The system shall be electrically supervised against opens and grounds on both station and signal wiring. Opens and grounds shall cause a trouble bell to sound at the control panel until manually silenced by the trouble bell silencing switch and shall not cause a false alarm to be sounded. Basic power supply for the system shall be 120 volts AC supplied from the emergency power system. Operation of all system components shall be 25 volts DC furnished by step down transformers and rectifiers within the control panel. The system shall allow for loading or editing special instructions and operation sequences as required. Software operations shall be stored in non-volatile programmable memory. Loss of primary and secondary power shall not erase the instructions stored in memory.
- B. The sequence of operation shall be that actuation of any manual or automatic sensors shall cause:
 - 1. All building alarm devices to sound
 - 2. Appropriate zone annunciators to annunciate
- C. Pressing the appropriate acknowledge button shall acknowledge any alarm or trouble condition. After the points have been acknowledged, the LED's shall glow steady and the panel audible signal will be silenced.
- D. The System Reset button shall be used to return the system to its normal state after an alarm condition has been remedied. Should the alarm condition continue to exist, the system will remain in an abnormal state.

2.02 CONTROL PANEL

- A. Control panel: fully modular type with all necessary control modules for system operation. Cabinet: constructed of code gauge steel with latch and cylinder type lock, semi-recessed mounted.
- B. Provide control modules, device alarm modules, signal modules, power supply module, automatic dual-rate battery charger and sealed, rechargeable type, electrolyte battery within the control panel.

2.03 PERIPHERAL DEVICES - INITIATING

- A. Smoke detectors shall be photoelectric type, operating on the photodiode, light scattering principle, and listed to UL 268. The sensor shall contain a flashing red LED for visual supervision which goes steady in alarm conditions, and a functional test switch. Provide detector bases as required to operate on 24 volts DC and allow complete functioning of the detector with the selected fire alarm system.

2.04 PERIPHERAL DEVICES - SIGNALING

- A. Audio/visual devices: combination electronic horn and xenon flash tube strobe indicator. Sound levels: between 96 db and 103 db, and lamps shall produce a candela level per NFPA at a flash rate of one flash per second. The unit: self rimmed and not require trim kit for semi-flush mount. The device: semi-flush mounted on a 4 inch square back box. The device: semi-flush mounted on a 4 inch square back box.
- B. Visual devices: xenon flash tube strobe indicator. The lamp shall produce a candela level per NFPA at a flash rate of one flash per second. The unit shall be self rimmed and not require trim kit for semi-flush mount.

2.05 WIRING

- A. Provide in accordance with NEC (Section 70 of NFPA) and Manufacturer's instructions, wiring, raceways, conduit and outlet boxes required for the erection of a complete system as described herein and as shown on the drawings. Install wiring in metallic conduit and of the approved type for fire alarm use. Wire and cable shall be UL listed and a minimum of 18 AWG or as required by local codes and the LAHJ. A consistent color code shall be used throughout and all wires shall be tagged at all junction points between conductors. Final connections between control equipment and the wiring system shall be made under direct supervision of a representative of the Manufacturer. Raceways containing conductors identified as "Fire Protective Alarm System" conductors shall not contain any other conductors and no AC or audio current carrying conductors shall be allowed in the same raceway with the D.C. fire alarm detection and signaling conductors.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Tag wires at junction points and at connections to equipment. Wire markers shall be of the taped band type of permanent material and shall be suitable and permanently stamped with the proper identification. The markers shall be attached in a manner that will not permit accidental detachment. Wiring shall test free from opens, grounds, and short circuits. Final connections between equipment and the wiring system shall be made under the supervision of a representative of the Manufacturer.
- B. Wiring for the fire alarm system shall be laid out in the most convenient form for this installation, and all such wiring shall be shown on the as-built drawings which are required under this Division of the specifications. As-built drawings shall also clearly indicate any connections and integration with the existing fire alarm system, as required. A wiring diagram shall be mounted inside the door of the fire alarm control panel.
- C. Provide two copies of completed instructions covering the operation and maintenance of the installed system, including circuit drawings and wiring diagrams of the system as actually installed, including as-built building alarm wiring. A complete list of part numbers and names, together with the name of the Manufacturer, shall be included in each manual.

- D. All equipment shall be held firmly in place. Fastening and supports shall be adequate to support the loads with a safety factor of five.
- E. Addressable devices connected to the fire alarm system shall be identified at the control panel by the room numbers/names assigned by the Owner. The room numbers/names shown on the drawings are for reference only.
- F. Label all devices with assigned address with a label clearly visible.

3.02 TESTS AND REPORTS

- A. Final Acceptance
 - 1. The system will be accepted only after a satisfactory test of the entire system has been accomplished by a factory-trained distributor in the presence of a representative of the Authority Having Jurisdiction and Owner's Representative.
- B. On-Site Services
 - 1. Provide the on-site services of an authorized technical representative of the Manufacturer to supervise all connections and fully test all devices and components of the system as installed. Owner's representative shall be instructed in the proper use and testing of the system.

3.03 WARRANTY

- A. Warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the complete and certified test or from the date of first beneficial use.
- B. The Equipment Manufacturer shall make available to the Owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year in compliance with NFPA-72H guidelines.

END OF SECTION 26 7200

SECTION 267500

MISC. SYSTEMS

PART 1 - GENERAL

1.01 SCOPE

- A. Provide empty conduit systems as indicated on the drawings and as required by the Data Systems provider.

PART 2 - PRODUCTS

2.01 CONDUIT

- A. Conduit shall be as specified under Section 261000 – BASIC MATERIALS AND METHODS.

2.02 OUTLET BOXES

- A. Outlet boxes shall be as specified under Section 261000 – BASIC MATERIALS AND METHODS

2.03 BACKBOARD

- A. Backboards shall be U.S. Plywood or approved equal of minimum 3/4 inch thickness, grade A/D minimum, and installed with good side exposed.

PART 3 - EXECUTION

3.01 INSTALLATION:

- A. Conduits shall contain a nylon pull wire.
- B. Provide pullboxes with blank cover plate minimum every 100 feet as directed by Telephone Company.
- C. The telephone service shall be installed as indicated on the drawings. Coordinate with the Telephone Company so that the entire system is installed in accordance with the Telephone Company standards and policies.
- D. Permanently and securely install backboards and paint with two coats of gray paint on both sides prior to the installation of any equipment.
- E. Provide (1) #6 awg ground wire to each telephone backboard location. The wire shall be connected to the electrical building grounding system.

END OF SECTION 26 7500