PROJECT MANUAL

Chatham County Human Resources

123 Abercorn Stret Savannah, Georgia Project No. 2012-10

October 26, 2012

Prepared by:

LOTT 🋟 BARBER

110 East President Street, Suite 300 Savannah, Georgia 31401 912.234.5230 (v) / 866-678-5688 (f) www.LottBarber.com

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Work under separate contracts.
 - 5. Purchase contracts.
 - 6. Owner-furnished products.
 - 7. Contractor-furnished, Owner-installed products.
 - 8. Access to site.
 - 9. Coordination with occupants.
 - 10. Work restrictions.
 - 11. Specification and drawing conventions.
 - 12. Miscellaneous provisions.
- B. Related Requirements:
 - 1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Chatham County Oglethorpe Building
 - 1. Project Location: 123 Abercorn Street, Savannah, GA 31401
- B. Owner: Chatham County 124 Bull Street, Savannah, GA 31401
 - 1. Owner's Representative: Michael Kaigler
- C. Architect: Lott+Barber, Inc. 110 East President Street, Suite 300, Savannah, GA 31401
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Smith & VandenBulck, W.H. Saussy III, P.C., Energy Ace, JB+A Inc.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Selective demolition and renovation of existing basement, first floor and second floors comprising 11,155 sf. renovation will create a new office for Chatham County Human Resources Department Work includes all new plumbing fixtures, repairs and modifications to existing HVAC, all new lighting and telecommunications and modifications to existing power. Complete accessibility upgrades throughout to include new elevator, wheelchair lift, 2 new accessible toilet spaces, hardware upgrades. Site work is limited to replacement of existing landscaping with new drought tolerant material design.
- B. Type of Contract:

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

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.6 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Preceding Work: Owner has awarded separate contract(s) for the following construction operations at Project site. Those operations are scheduled to be substantially complete before work under this Contract begins.
 - 1. Subcontract to install fiber optic telecommunication wiring to building.
- C. Concurrent Work: Owner will award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.
 - 1. Telecommunication equipment/hardware to support telephone and data cabling within Electrical/IDF rooms.
- D. Subsequent Work: Owner will award separate contract(s) for the following additional work to be performed at site following Substantial Completion. Completion of that work will depend on successful completion of preparatory work under this Contract.
 - 1. Telephone and audio visual equipment
 - 2. Furniture and loose equipment purchase and installation

1.7 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- C. 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. Limits: Confine construction operations to Property limit to the north end east edge of curb on south and west sides of the building.
 - 2. Driveways, Walkways and Entrances: Keep driveways loading areas, and entrances serving premises and adjacent property owners clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- D. 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.

1.8 COORDINATION WITH OCCUPANTS

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

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:30 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: Must be approved by Owner 1 week in advance.
 - 2. Early Morning Hours: Must be approved by Owner 1 week in advance.
 - 3. Hours for Utility Shutdowns: provide 72 hour notice
 - 4. Hours for Core Drilling is not to be performed before 9:00 a.m.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Architect not less than three days in advance of proposed utility interruptions.
 - 2. Obtain Architect's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Architect not less than three days in advance of proposed disruptive operations.
 - 2. Obtain Architect's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances within the existing building and project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.10 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.

SUMMARY

- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. One: Accordion folding partition and track within Testing/Training Room 104.
 1. Base Bid: Do not install accordion folding partition or track, but do install structural header above
 - ceiling to support partition.
 - 2. Alternate: Install accordion folding partition and track within Testing/Training Room 104 where illustrated. Reference floor plan and specification section 10226 "Accordion Folding Partition" for more information.
- B. Alternate No. Two: Replace carpet.
 - 1. Base Bid: Retain existing carpet flooring where indicated to remain in Finish Schedule; protect from damage.
 - 2. Alternate: Demolish and recycle existing carpet flooring where scheduled to remain and replace with new carpet CPT-1 at these locations. Reference Finish Schedule and Specification Section 096816 "Sheet Carpeting" for more information.
- C. Alternate No. Three: Paint existing exterior wood trim and steel railings.
 - 1. Base Bid: The only exterior paint work to be included in base bid is painting of doors 100A, 108A, 114A, and 127B.
 - 2. Alternate: Scrape any loose paint from all existing wood trim and steel railings on exterior of building and prime paint plus 2 finish coats matching same color as existing. Reference Specification Section 099113 "Exterior Painting" for paint system.

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SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 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.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from [ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

- k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- 3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 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.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 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.

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 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. Requested substitution provides sustainable design characteristics that specified product provided[for achieving LEED prerequisites and credits.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

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

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - relationship. Use available total float before requesting an extension of the Contract Time.
 Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

7. Proposal Request Form: Use form acceptable to Architect.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 2. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
 - 3. Section 018113.13 "Sustainable Design Requirements LEED for New Construction and Major Renovations" for administrative requirements governing submittal of cost breakdown information required for LEED documentation.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
 - c. Items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
 - 2. Arrange schedule of values using AIA Document G703
 - 3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.

- b. Description of the Work.
- c. Name of subcontractor.
- d. Name of manufacturer or fabricator.
- e. Name of supplier.
- f. Change Orders (numbers) that affect value.
- g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
- 4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 - a. Include separate line items under Contractor and principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
- 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
- 7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
- 9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architectand paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Architect by the 25th day of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
 - 1. Submit draft copy of Application for Payment three days prior to due date for review by Architect.

- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- G. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
 - 2. When an application shows completion of an item, submit conditional final or full waivers.
 - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
 - 1. List of subcontractors.
 - 2. Schedule of values.
 - 3. LEED submittal for project materials cost data.
 - 4. Contractor's construction schedule (preliminary if not final).
 - 5. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
 - 6. LEED action plans.
 - 7. Submittal schedule (preliminary if not final).
 - 8. List of Contractor's staff assignments.

- 9. List of Contractor's principal consultants.
- 10. Certificates of insurance and insurance policies.
- 11. Performance and payment bonds.
- 12. Data needed to acquire Owner's insurance.
- J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
 - 6. AIA Document G707, "Consent of Surety to Final Payment."
 - 7. Evidence that claims have been settled.
 - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

RELATED DOCUMENTS 1.1

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

SUMMARY 1.2

- Section includes administrative provisions for coordinating construction operations on Project including, but A. not limited to, the following:
 - General coordination procedures. 1.
 - 2. 3. Requests for Information (RFIs). Project meetings.
- Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned Β. to a specific contractor.
- C. **Related Requirements:**
 - Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule. 1.
 - 2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.
 - 3.

1.3 DEFINITIONS

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

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- 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 A. following information in tabular form:
 - Name, address, and telephone number of entity performing subcontract or supplying products. 1.
 - 2. Number and title of related Specification Section(s) covered by subcontract.
 - 3 Drawing number and detail references, as appropriate, covered by subcontract.
- 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 Β. and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
 - Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. 1. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

- Coordination: Coordinate construction operations included in different Sections of the Specifications to Α. 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.
 - 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. 1.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair. Make adequate provisions to accommodate items scheduled for later installation.
 - 3.
- Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, Β. 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.
- 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. Prepare C. 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 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:
 - Preparation of Contractor's construction schedule. Preparation of the schedule of values.

 - 1. 2. 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5.
 - Progress meetings. Preinstallation conferences. 6.
 - 7. Project closeout activities.
 - Startup and adjustment of systems. 8.
- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste. 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.

1.6 COORDINATION DRAWINGS

- Coordination/Shop Drawing Digital Data Files: Prepare coordination/shop drawing digital data files according A. to the following requirements:
 - File Preparation Format: DWG, Version AutoCad 2010, operating in Microsoft Windows operating 1. system.
 - 2. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - Architect makes no representations as to the accuracy or completeness of digital data files as a.
 - they relate to Drawings. Digital Data Software Program: Drawings are available in AutoCad 2010 version. Cost for an entire set is \$400.00 or \$30.00 per sheet. Contractor shall execute a data licensing agreement is furnished by Architect prior to release b.
 - c. of digital data.

1.7 **REQUESTS FOR INFORMATION (RFIs)**

- General: Immediately on discovery of the need for additional information or interpretation of the Contract A. Documents, Contractor shall prepare and submit an RFI in the form specified.
 - Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no 1. response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- Β. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - Project name.
 - Project number.
 - 1. 2. 3. 4. 5. 6. 7. Date.
 - Name of Contractor.
 - Name of Architect.
 - RFI number, numbered sequentially.
 - RFI subject.
 - Specification Section number and title and related paragraphs, as appropriate. 8
 - Drawing number and detail references, as appropriate.
 - 10.
 - Field dimensions and conditions, as appropriate. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI. 11.
 - 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.

- Include dimensions, thicknesses, structural grid references, and details of affected materials, а assemblies, and attachments on attached sketches.
- C. **RFI Forms: Furnished by Architect**
 - 1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
 - The following Contractor-generated RFIs will be returned without action: 1.
 - Requests for approval of submittals. a.
 - Requests for approval of substitutions. b.
 - c. d. Requests for approval of Contractor's means and methods.
 - Requests for coordination information already indicated in the Contract Documents.
 - Requests for adjustments in the Contract Time or the Contract Sum. e.
 - f. Requests for interpretation of Architect's actions on submittals.
 - Incomplete RFIs or inaccurately prepared RFIs. g.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract 3. Modification Procedures.'
 - If Contractor believes the RFI response warrants change in the Contract Time or the Contract a. Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:
 - Project name.
 - Name and address of Contractor.
 - 2. 3. Name and address of Architect.
 - 4. RFI number including RFIs that were returned without action or withdrawn.
 - 5. RFI description.
 - 6. 7. Date the RFI was submitted.
 - Date Architect's response was received.
- On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected E. parties. Review response and notify Architect within seven days if Contractor disagrees with response.
 - 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
 - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

- General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated. А.
 - 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. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements 1.
 - 2.
 - 3. achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- Β. Preconstruction Conference: Architect will 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.
 - Conduct the conference to review responsibilities and personnel assignments. 1.
 - 2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - Tentative construction schedule. a.
 - Phasing. b.
 - Critical work sequencing and long-lead items. c.

- d. Designation of key personnel and their duties.
- Lines of communications. e. f.
- Procedures for processing field decisions and Change Orders. Procedures for RFIs.
- g. h.
- Procedures for testing and inspecting.
- Procedures for processing Applications for Payment. Distribution of the Contract Documents. i.
- j. k.
- Submittal procedures.
- 1.
- Preparation of record documents. Use of the premises and existing building. m.
- Work restrictions. n.
- Working hours. 0.
- p.
- Owner's occupancy requirements. Responsibility for temporary facilities and controls. Procedures for moisture and mold control. q.
- r.
- Procedures for disruptions and shutdowns. s.
- Construction waste management and recycling. t.
- Parking availability. u.
- v. Office, work, and storage areas.
- Equipment deliveries and priorities. w.
- First aid. х.
- Security. y.
- Progress cleaning. z.
- 4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. LEED Coordination Conference: Architect will schedule and conduct a LEED coordination conference before starting construction, at a time convenient to Owner, Architect, and Contractor.
 - Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and LEED coordinator; major subcontractors; 1. suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Discuss items of significance that could affect meeting requirements for LEED certification, including the following:
 - LEED Project Checklist. a.
 - General requirements for LEED-related procurement and documentation. b.
 - Project closeout requirements and LEED certification procedures. c. d.
 - Role of LEED coordinator.
 - e. Construction waste management.
 - f. Construction operations and LEED requirements and restrictions.
 - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
 - 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect 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.
 - Options. b.
 - c. d. Related RFIs.
 - Related Change Orders.
 - Purchases.
 - e. f. Deliveries.
 - g. h. Submittals.

 - LEED requirements. Review of mockups. Possible conflicts. i.

 - j. k. Compatibility requirements.
 - 1. Time schedules.
 - m. Weather limitations.
 - Manufacturer's written instructions. n.
 - Warranty requirements. о.
 - p.
 - Compatibility of materials. Acceptability of substrates. q.
 - Temporary facilities and controls. r.
 - Space and access limitations. S

- Regulations of authorities having jurisdiction. Testing and inspecting requirements. t
- u.
- Installation procedures. v.
- Coordination with other work. W.
- Required performance results. x.
- Protection of adjacent work. y.
- Protection of construction and personnel. z.
- 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.
- Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion. E.
 - 1. 2. Conduct the conference to review requirements and responsibilities related to Project closeout.
 - Attendees: Authorized representatives of Owner, 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.
 - Agenda: Discuss items of significance that could affect or delay Project closeout, including the 3. following:
 - Preparation of record documents. a.
 - Procedures required prior to inspection for Substantial Completion and for final inspection for b. acceptance.
 - Submittal of written warranties. c.
 - d. Requirements for completing LEED documentation.
 - Requirements for preparing operations and maintenance data.
 - e. f. Requirements for delivery of material samples, attic stock, and spare parts.
 - Requirements for demonstration and training. g. h.
 - Preparation of Contractor's punch list.
 - Procedures for processing Applications for Payment at Substantial Completion and for final i. payment. Submittal procedures.
 - ŀ. k.
 - Coordination of separate contracts.
 - Owner's partial occupancy requirements. 1.
 - Installation of Owner's furniture, fixtures, and equipment. m.
 - Responsibility for removing temporary facilities and controls. n.
 - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Conduct progress meetings at monthly intervals.

 - Coordinate dates of meetings with preparation of payment requests. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or 1. 2. 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.
 - 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 a. revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - Review schedule for next period. 1)
 - Review present and future needs of each entity present, including the following: b.
 - Interface requirements.
 - 1) 2) 3) 4) 5) Sequence of operations.
 - Resolution of BIM component conflicts.
 - Status of submittals.
 - Status of LEED documentation.

- 6) 7) 8) Deliveries.
- Off-site fabrication.
- Access.
- 9) 10) Site utilization.
- Temporary facilities and controls. 11)
- Progress cleaning. Quality and work standards.
- 12) 13) Status of correction of deficient items.
- 14) Field observations.
- 15) Status of RFIs.
- Status of proposal requests. Pending changes. Status of Change Orders. 16)
- 17)
- 18)
- 19) Pending claims and disputes.
- 20) 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.
 - 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. a.
- Coordination Meetings: Conduct Project coordination meetings at regular intervals. Project coordination G meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
 - Attendees: In addition to representatives of Owner, each contractor, subcontractor, supplier, and other 1. 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project
 - 2. of Project.
 - Combined Contractor's Construction Schedule: Review progress since the last coordination a. meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue b. revised schedule concurrently with report of each meeting.
 - Review present and future needs of each contractor present, including the following: C.

 - 1) 2) 3) 4) 5) 6) 7) 8) 9)
 - Interface requirements. Sequence of operations. Resolution of BIM component conflicts.
 - Status of submittals.
 - Deliveries.
 - Off-site fabrication.
 - Access.
 - Site utilization.
 - Temporary facilities and controls.
 - 10) Work hours.
 - 11) (12)Hazards and risks.
 - Progress cleaning.
 - 13) Quality and work standards.
 - 14) Change Orders.
 - 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section includes administrative and procedural requirements for documenting the progress of construction А. during performance of the Work, including the following:
 - Startup construction schedule. 1.
 - Contractor's construction schedule.
 - Construction schedule updating reports.
 - 2. 3. 4. Daily construction reports.
 - 5. Material location reports.
 - Site condition reports. 6.
 - Special reports.

B. **Related Requirements:**

- Section 013300 "Submittal Procedures" for submitting schedules and reports. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections. 1. 2.

1.3 DEFINITIONS

- Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and A. controlling the construction project. Activities included in a construction schedule consume time and resources.
 - Critical Activity: An activity on the critical path that must start and finish on the planned early start 1. and finish times.
 - Predecessor Activity: An activity that precedes another activity in the network. Successor Activity: An activity that follows another activity in the network.
 - 2. 3.
- Β. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- C. Event: The starting or ending point of an activity.
- D. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- E. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- Format for Submittals: Submit required submittals in the following format: A.
 - 1. Working electronic copy of schedule file, where indicated.
 - 2.3. PDF electronic file.
 - Three paper copies.
- Β. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.

- D. Weekly Construction Reports: Submit at weekly intervals.
- E. Special Reports: Submit at time of unusual event.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal Β. schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
 - Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order. 1.
- Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following: Β.
 - Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed 1. by Architect.
 - Procurement Activities: Include procurement process activities for the following long lead items and 2. major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. Elevator
 - Wheelchair lift b.
 - Structural modifications/repairs complete c.
 - Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction 3. schedule with submittal schedule.
 - 4.
 - Startup and Testing Time: Include no fewer than 15 days for startup and testing. Substantial Completion: Indicate completion in advance of date established for Substantial 5. Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 - Punch List and Final Completion: Include not more than 30 days for completion of punch list items 6. and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 - 1.
 - 2.
 - Work under More Than One Contract: Include a separate activity for each contract. Work by Owner: Include a separate activity for each portion of the Work performed by Owner. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible 3. delivery date.
 - Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible 4. delivery date.
 - 5. Work Restrictions: Show the effect of the following items on the schedule:
 - Coordination with existing construction. a.
 - b. Limitations of continued occupancies.
 - Uninterruptible services. c.
 - Partial occupancy before Substantial Completion. d.
 - Use of premises restrictions. e.
 - f. Provisions for future construction.
 - Seasonal variations. g. h
 - Environmental control.

- Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following: 6.
 - Subcontract awards. a.
 - b. Submittals.
 - c. d. Purchases.
 - Mockups.
 - Fabrication.
 - e. f. Sample testing.
 - Deliveries. g. h.
 - Installation.
 - Tests and inspections. i.
 - Adjusting.]. k.

1.

- Curing.
- Startup and placement into final use and operation.
- 7. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - Structural completion. a.
 - b. Temporary enclosure and space conditioning.
 - Permanent space enclosure. c.
 - d. Completion of mechanical installation.
 - Completion of electrical installation. e.
 - f. Substantial Completion.
- Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited D. to, the Notice to Proceed, Substantial Completion, and final completion., and the following interim milestones:
 - Temporary enclosure of exterior modifications. 1.
 - 2. 3. Elevator operation.
 - Building commissioning completion. Test and balance of HVAC.
 - 4.
 - Substantial Completion 5.
 - Demonstration/Maintenance training. 6.
 - Contractor submission of all construction LEED credit back-up. 7
- Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues: E.
 - 1. Unresolved issues.
 - $\hat{2}$ Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONSTRUCTION SCHEDULE

- Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of A. date established for the Notice to Proceed.
- Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities and critical path schedule for Β. entire duration of construction.
- Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the C. following:
 - Identification of activities that have changed. 1.
 - Changes in early and late start dates. 2.
 - <u>3</u>. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.

- 5.
- Changes in the critical path. Changes in total float or slack time. 6.
- 7. Changes in the Contract Time.

2.3 REPORTS

A.

- Weekly Construction Reports: Prepare a weekly construction report recording the following information concerning events at Project site:
 - List of subcontractors at Project site.
 - Approximate count of personnel at Project site. Equipment at Project site.

 - Material deliveries.
 - 2. 3. 4. 5. 6. Accidents.
 - Meetings and significant decisions.
 - 7. Unusual events
 - 8.
 - Stoppages, delays, shortages, and losses. RFI updates and listing of items still needing decisions.
 - Change Orders received and implemented. 10.
 - 11.
 - Construction Work Change Directives received and implemented. Construction status of MEP systems and other major construction components. 6-10 construction photos illustrating current progress. 12.
 - 13
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- General: Submit special reports directly to Owner within one day(s) of an occurrence. Distribute copies A. of report to parties affected by the occurrence.
- Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, Β. whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

CONTRACTOR'S CONSTRUCTION SCHEDULE 3.1

- Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual A. construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations. As the Work progresses, indicate final completion percentage for each activity.
 - 3.
- Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility. Β.
 - Post copies in Project meeting rooms and temporary field offices.
 - 1. 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
 - 3. Final completion construction photographs.
 - 4. Preconstruction video recordings.
 - 5. Periodic construction video recordings.

B. Related Requirements:

- 1. Section 013300 "Submittal Procedures" for submitting photographic documentation.
- 2. Section 017700 "Closeout Procedures" for submitting photographic documentation as project record documents at Project closeout.
- 3. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
- 4. Section 024119 "Selective Structure Demolition" for photographic documentation before selective demolition operations commence.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For photographer.
- B. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- C. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Digital Camera: Minimum sensor resolution of 8 megapixels.
 - 2. Format: Minimum 3200 by 2400 pixels, in unaltered original files, with same aspect ratio as the sensor, uncropped, date and time stamped, in folder named by date of photograph, accompanied by key plan file.
 - 3. Identification: Provide the following information with each image description in file metadata tag:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Date photograph was taken.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - g. Unique sequential identifier keyed to accompanying key plan.
- D. Construction Photographs: Submit two prints of each photographic view within seven days of taking photographs.
 - 1. Format: 8-by-10-inch (203-by-254-mm) smooth-surface matte prints on single-weight, commercial-grade photographic paper; enclosed back to back in clear plastic sleeves that are punched for standard three-ring binder.
 - 2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Architect.

- d. Name of Contractor.
- Date photograph was taken if not date stamped by camera. e.
- Description of vantage point, indicating location, direction (by compass point), and elevation f. or story of construction.
- Unique sequential identifier keyed to accompanying key plan. g.
- E. Video Recordings: Submit video recordings within seven days of recording.
 - Submit video recordings in digital video disc format acceptable to Architect. 1. 2.
 - Identification: With each submittal, provide the following information:
 - Name of Project. a.
 - Name and address of photographer. b.
 - Name of Architect. C.
 - d. Name of Contractor.
 - e. Date video recording was recorded.
 - f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - Weather conditions at time of recording. g.

1.4 QUALITY ASSURANCE

Photographer Qualifications: An individual who has been regularly engaged as a professional photographer A. of construction projects for not less than three years.

1.5 USAGE RIGHTS

Obtain and transfer copyright usage rights from photographer to Owner and Architect for unlimited A. reproduction of photographic documentation.

PART 2 - PRODUCTS

2.1PHOTOGRAPHIC MEDIA

Digital Images: Provide images in JPG format, produced by a digital camera with minimum sensor size of A. 8 megapixels, and at an image resolution of not less than 3200 by 2400 pixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly Β. show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
 - Date and Time: Include date and time in file name for each image. 1.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.
- D. Preconstruction Photographs: Before commencement of excavation, commencement of demolition and starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Take 20 photographs to show existing exterior conditions adjacent to property before starting the Work.
 - 2. Take 20 photographs of existing interior building either on or adjoining property to accurately record physical conditions at start of construction.

- 3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- E. Periodic Construction Photographs: Take 20 photographs monthly, 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.
- F. Architect-Directed Construction Photographs: From time to time, Architect will instruct photographer about number and frequency of photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.
- G. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as project record documents. Architect will inform photographer of desired vantage points.
 - 1. Do not include date stamp.
- H. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
 - 1. Three days' notice will be given, where feasible.
 - 2. In emergency situations, take additional photographs within 24 hours of request.
 - 3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

3.2 CONSTRUCTION VIDEO RECORDINGS

- A. Video Recording Photographer: Engage a qualified videographer to record construction video recordings.
- B. Recording: Mount camera on tripod before starting recording unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video recording, record weather conditions from local newspaper or television and the actual temperature reading at Project site.
- C. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.
 - 1. Confirm date and time at beginning and end of recording.
 - 2. Begin each video recording with name of Project, Contractor's name, videographer's name, and Project location.

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SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section includes requirements for the submittal schedule and administrative and procedural requirements A. for submitting Shop Drawings, Product Data, Samples, and other submittals.
- **Related Requirements:** Β.
 - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values
 - Section 013200 "Construction Progress Documentation" for submitting schedules and reports, 2. including Contractor's construction schedule. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance
 - 3. manuals.
 - Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, 4. and record Product Data. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of
 - 5. equipment and training of Owner's personnel.

1.3 DEFINITIONS

- Action Submittals: Written and graphic information and physical samples that require Architect's A. responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- Informational Submittals: Written and graphic information and physical samples that do not require Β. 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."
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for D. representing documents in a device-independent and display resolution-independent fixed-layout document format.

SUBMITTAL ADMINISTRATIVE REQUIREMENTS 1.4

- Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by А. Architect for Contractor's use in preparing submittals.
 - Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for 1. use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - Digital Drawing Software Program: The Contract Drawings are available in AutoCad 2010. b.
 - Contractor shall execute a data licensing agreement in a form provided by the Architect. C.
 - d. Cost for entire set is \$400.00 or \$30.00 per sheet before releasing files.
- Β. 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. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule. 2.
 - Submit action submittals and informational submittals required by the same Specification Section 3. as separate packages under separate transmittals.
 - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- Architect reserves the right to withhold action on a submittal requiring coordination with a. other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination. 1.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3.
 - Resubmittal Review: Allow 15 days for review of each resubmittal. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal. 4.
 - a. Hydraulic elevator
 - Structural steel b.
 - Lighting fixtures C.
- D. Submittals: All submittals to be provided in PDF format, no paper copies of submittals shall be provided. Place a permanent label or title block on each submittal item for identification.
 - 1. 2. Indicate name of firm or entity that prepared each submittal on label or title block.
 - Include the following information for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - Name of Architect. c.
 - d. Name of Construction Manager.
 - Name of Contractor. e. f.
 - Name of subcontractor.
 - Name of supplier. g. h.
 - Name of manufacturer. i.
 - Submittal number or other unique identifier, including revision identifier.
 - Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A). 1)
 - j. k.

 - Number and title of appropriate Specification Section. Drawing number and detail references, as appropriate. Location(s) where product is to be installed, as appropriate. 1.
 - Other necessary identification. m.
 - 3. Transmittal for Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return without review submittals received from sources other than Contractor.
 - Transmittal Form for Paper Submittals: Provide locations on form for the following a. information:
 - Project name.
 - 1)Date.
 - Destination (To:).
 - Source (From:).
 - Name and address of Architect.
 - Name of Construction Manager. Name of Contractor.

 - Name of firm or entity that prepared submittal.
 - 2) 3) 4) 5) 6) 7) 8) 9) 10) Names of subcontractor, manufacturer, and supplier. Category and type of submittal.

 - (11)
 - Submittal purpose and description. Specification Section number and title.
 - 12) 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
 - 14)Drawing number and detail references, as appropriate.
 - 15) Indication of full or partial submittal.
 - 16) Transmittal number, numbered consecutively.
 - Submittal and transmittal distribution record. 17)
 - 18) Remarks.

SUBMITTAL PROCEDURES
- 19)Signature of transmitter.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form as initial submittal.
 - Note date and content of previous submittal. 1.
 - Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 2. 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, H. installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

SUBMITTAL PROCEDURES 2.1

- General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections. A.
 - 1. Submit electronic submittals via email as PDF electronic files.
 - a. Architectwill return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - Provide a digital signature with digital certificate on electronically submitted certificates and a. certifications where indicated.
 - Provide a notarized statement on original paper copy certificates and certifications where b. indicated.
- Β. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 - If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data. Mark each copy of each submittal to show which products and options are applicable. 1.

 - 2. 3. Include the following information, as applicable:
 - Manufacturer's catalog cuts. a.
 - Manufacturer's product specifications. b.
 - Standard color charts. c.
 - d. Statement of compliance with specified referenced standards.
 - Testing by recognized testing agency. e.
 - Application of testing agency labels and seals. f.
 - Notation of coordination requirements. g. h.
 - Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - Wiring diagrams showing factory-installed wiring. a.
 - Printed performance curves. b.
 - Operational range diagrams. c.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5.
 - Submit Product Data concurrent with Samples. Submit Product Data in the following format: PDF electronic file of paper documents. 6
- 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. C.

- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - Identification of products. a.
 - b. Schedules.
 - Compliance with specified standards. Notation of coordination requirements. c. d.

 - Notation of dimensions established by field measurement. e. f.
 - Relationship and attachment to adjoining construction clearly indicated.
 - Seal and signature of professional engineer if specified. g.
- 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
- 3. Submit Shop Drawings in the following format: PDF format
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - Generic description of Sample. a.
 - Product name and name of manufacturer. b.
 - Sample source. c.
 - d.
 - Number and title of applicable Specification Section. Specification paragraph number and generic name of each item. e.
 - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 - 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. 4.
 - 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. a.
 - Samples not incorporated into the Work, or otherwise designated as Owner's property, are b. the property of Contractor.
 - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, a. or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same 6. 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. Architect will retain one Sample sets; remainder will be returned.
 - Submit a single Sample where assembly details, workmanship, fabrication techniques, 1) connections, operation, and other similar characteristics are to be demonstrated.
 - 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 2) approximate limits of variations.
- 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 E. 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.
 - Manufacturer and product name, and model number if applicable. 2
 - 3. Number and name of room or space.

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- 4. Location within room or space.
- 5. Submit product schedule in the following format: PDF format
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination.
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation.
- Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures." H.
- Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements." I.
- Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in J. Section 017700 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data.'
- LEED Submittals: Comply with requirements specified in Section 018113.13 "Sustainable Design Requirements LEED for New Construction and Major Renovations," Section 018113.16 "Sustainable Design Requirements LEED for Commercial Interiors," Section 018113.19 "Sustainable Design Requirements LEED for Core and Shell Development," and Section 018113.23 "Sustainable Design Requirements LEED for Schools." L.
- M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure N. Qualification Record on AWS forms. Include names of firms and personnel certified.
- Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer О. complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that P. manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- Product Certificates: Submit written statements on manufacturer's letterhead certifying that product Q. complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- 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 S. Documents.
- T. 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.
- U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - Name of evaluation organization. 1. 2. 3.
 - Date of evaluation.
 - Time period when report is in effect.
 - Product and manufacturers' names.
 - 4. 5. Description of product.
 - Test procedures and results. 6.
 - Limitations of use.
- 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 V. compliance with performance requirements in the Contract Documents.

- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit five paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

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

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
 - 2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
 - 3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- Experienced: When used with an entity or individual, "experienced" means having successfully completed J. a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

- Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities. A.
- Β. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 - 1. Specification Section number and title.
 - Entity responsible for performing tests and inspections. 2.
 - Description of test and inspection. 3.
 - Identification of applicable standards. 4.
 - Identification of test and inspection methods. 5.
 - 6. Number of tests and inspections required.
 - Time schedule or time span for tests and inspections. 7.
 - 8. Requirements for obtaining samples.
 - 9. Unique characteristics of each quality-control service.

1.6 CONTRACTOR'S QUALITY-CONTROL PLAN

- Quality-Control Plan, General: Submit quality-control plan within 20 days of Notice to Proceed, and not A. less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- Β. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - Owner-performed tests and inspections indicated in the Contract Documents, including tests and 3. inspections indicated to be performed by the Commissioning Authority.

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, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.
 - 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 6. Statement whether conditions, products, and installation will affect warranty.
 - 7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement that equipment complies with requirements.
 - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 4. Statement whether conditions, products, and installation will affect warranty.
 - 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.8 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.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
 - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.

- 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
- 4. Demonstrate the proposed range of aesthetic effects and workmanship.
- 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
- 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
- 7. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- M. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections.

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 inspecting they are engaged to perform.
 - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
 - 3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 - 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

- E. Retesting/Reinspecting: 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.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
 - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - 6. Do not perform any duties of Contractor.
- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - 1. Access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - 4. Facilities for storage and field curing of test samples.
 - 5. Delivery of samples to testing agencies.
 - 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
 - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
 - 1. Distribution: Distribute schedule to Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
 - 1. Date test or inspection was conducted.
 - 2. Description of the Work tested or inspected.
 - 3. Date test or inspection results were transmitted to Architect.
 - 4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

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SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

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

REFERENCES

10/26/12

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| IAPMO | International Association of Plumbing and Mechanical Officials | (909) 472-4100 | |
|--------|--|----------------|--|
| | www.iapmo.org | | |
| ICC | International Code Council | (888) 422-7233 | |
| | www.iccsafe.org | | |
| ICC-ES | ICC Evaluation Service, Inc. | (800) 423-6587 | |
| | www.icc-es.org | (562) 699-0543 | |
| UBC | Uniform Building Code | | |
| | (See ICC) | | |

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| CE | Army Corps of Engineers | (202) 761-0011 |
|-------|---|----------------|
| | www.usace.army.mil | |
| CPSC | Consumer Product Safety Commission | (800) 638-2772 |
| | www.cpsc.gov | (301) 504-7923 |
| DOC | Department of Commerce | (202) 482-2000 |
| | www.commerce.gov | |
| DOD | Department of Defense | (215) 697-6257 |
| | http://.dodssp.daps.dla.mil | |
| DOE | Department of Energy | (202) 586-9220 |
| | www.energy.gov | |
| EPA | Environmental Protection Agency | (202) 272-0167 |
| | www.epa.gov | |
| FAA | Federal Aviation Administration | (866) 835-5322 |
| | www.faa.gov | |
| FCC | Federal Communications Commission | (888) 225-5322 |
| | www.fcc.gov | |
| FDA | Food and Drug Administration | (888) 463-6332 |
| | www.fda.gov | |
| GSA | General Services Administration | (800) 488-3111 |
| | www.gsa.gov | |
| HUD | Department of Housing and Urban Development | (202) 708-1112 |
| | www.hud.gov | |
| LBL | Lawrence Berkeley National Laboratory | (510) 486-4000 |
| | www.lbl.gov | |
| NCHRP | National Cooperative Highway Research Program | |
| | (See TRB) | |

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| NIST | National Institute of Standards and Technology
www.nist.gov | (301) 975-6478 |
|------|---|----------------------------------|
| OSHA | Occupational Safety & Health Administration
www.osha.gov | (800) 321-6742
(202) 693-1999 |
| PBS | Public Buildings Service
(See GSA) | |
| PHS | Office of Public Health and Science
www.osophs.dhhs.gov/ophs | (202) 690-7694 |
| RUS | Rural Utilities Service
(See USDA) | (202) 720-9540 |
| SD | State Department
www.state.gov | (202) 647-4000 |
| TRB | Transportation Research Board
http://gulliver.trb.org | (202) 334-2934 |
| USDA | Department of Agriculture
www.usda.gov | (202) 720-2791 |
| USPS | Postal Service
www.usps.com | (202) 268-2000 |

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

| ADAAG | Americans with Disabilities Act (ADA) | (800)
872-2253 |
|---------|--|-------------------|
| | Architectural Barriers Act (ABA) | (202)
272-0080 |
| | Accessibility Guidelines for Buildings and Facilities | |
| | Available from U.S. Access Board | |
| | www.access-board.gov | |
| CFR | Code of Federal Regulations | (866)
512-1800 |
| | Available from Government Printing Office | (202)
512-1800 |
| | www.gpoaccess.gov/cfr/index.html | |
| DOD | Department of Defense Military Specifications and Standards | (215)
697-2664 |
| | Available from Department of Defense Single Stock Point | |
| | http://dodssp.daps.dla.mil | |
| DSCC | Defense Supply Center Columbus | |
| | (See FS) | |
| FED-STD | Federal Standard | |
| | (See FS) | |
| FS | Federal Specification | (215)
697-2664 |
| | Available from Department of Defense Single Stock Point | |
| | http://dodssp.daps.dla.mil | |
| | Available from Defense Standardization Program www.dps.dla.mil | |

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GEORGIA | 10/26/12 |
|--------------------|-------------------------------|---|--|
| | | Available from General Services Administration | (202)
619-8925 |
| | | www.gsa.gov | |
| | | Available from National Institute of Building Sciences | (202)
289-7800 |
| | | www.wbdg.org/ccb | |
| FTMS | | Federal Test Method Standard (see FS) | |
| MIL | | (See MILSPEC) | |
| MIL-S7 | ГD | (See MILSPEC) | |
| MILSP | EC | Military Specification and Standards | (215)
697-2664 |
| | | Available from Department of Defense Single Stock Point | |
| | | http://dodssp.daps.dla.mil | |
| UFAS | | Uniform Federal Accessibility Standards | (800)
872-2253 |
| | | Available from Access Board | (202)
272-0080 |
| | | www.access-board.gov | |
| E. | Stat
Con
telej
of th | e Government Agencies: Where abbreviations and acronyms are used in Spe
tract Documents, they shall mean the recognized name of the entities in the foll
phone numbers, and Web sites are subject to change and are believed to be accura
ne date of the Contract Documents. | cifications or other
owing list. Names,
te and up-to-date as |
| CBHF | State
and ' | e of California, Department of Consumer Affairs Bureau of Home Furnishings
Thermal Insulation | (800)
952-5210 |
| | WWV | v.dca.ca.gov/bhfti | (916)
574-2041 |
| CCR | Cali | fornia Code of Regulations | (916)
323-6815 |
| | www | v.calregs.com | |

(415) 703-2782

(979) 458-6650

CPUC California Public Utilities Commission

www.cpuc.ca.gov TFS Texas Forest Service

Forest Resource Development http://txforestservice.tamu.edu

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

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SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

RELATED DOCUMENTS 1.1

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

1.2 SUMMARY

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

1.3 USE CHARGES

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

1.4 INFORMATIONAL SUBMITTALS

- Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction A. personnel.
- Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Β. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work. 2.
- D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
 - Locations of dust-control partitions at each phase of work. HVAC system isolation schematic drawing. Location of proposed air-filtration system discharge. Waste handling procedures. 1.
 - 2.
 - 3.
 - 4.
 - 5 Other dust-control measures.

QUALITY ASSURANCE 1.5

- Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric A. service. Install service to comply with NFPA 70.
- Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits. Β.
- Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1. C.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Contractor's option to provide minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized-steel bases for supporting posts.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

2.2 TEMPORARY FACILITIES

- A. 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. Office can be located within interior of building. 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.
 - 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- (1.2-m-) square tack and marker boards.
 Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
 - 6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment:
 - 1. Permanent HVAC System: Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction. and clean HVAC system as required in Section 017700 "Closeout Procedures"

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
 - 1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

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- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition D. existing before initial use.
- Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction E. personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- F. 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.
- Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of G. high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- Lighting: Provide temporary lighting with local switching that provides adequate illumination for L construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - 2. Install lighting for Project identification sign.
- Telephone Service: Provide temporary telephone service in common-use facilities for use by all J. construction personnel. Install one telephone line(s) for each field office.
 - 1. Provide additional telephone lines for the following:
 - a. Provide a dedicated telephone line for each facsimile machine in each field office.
 - 2. At each telephone, post a list of important telephone numbers.
 - Police and fire departments. a.
 - Ambulance service. b.
 - Contractor's home office. c.
 - d. Contractor's emergency after-hours telephone number.
 - e. f. Architect's office.
 - Engineers' offices.
 - Owner's office. g. h.
 - Principal subcontractors' field and home offices.
 - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- K. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:
 - Processor: Intel Pentium D or Intel CoreDuo, 3.0 GHz processing speed.
 - 2. 3. 4. 5.
 - Memory: 4 gigabyte. Disk Storage: 300 gigabyte hard-disk drive and combination DVD-RW/CD-RW drive. Display: 22-inch (560-mm) LCD monitor with 256-Mb dedicated video RAM. Full-size keyboard and mouse.

 - Network Connectivity: 10/100BaseT Ethernet. Operating System: Microsoft Windows XP Professional or Microsoft Windows Vista Business. Productivity Software: 6. 7.
 - Microsoft Office Professional, XP or higher, including Word, Excel, and Outlook. a.
 - Adobe Reader 7.0 or higher. b.
 - WinZip 7.0 or higher. c.

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- Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these three functions. 9.
- 10.
- Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 384 Kbps upload and 2 Mbps download speeds at each computer. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and span protection in a combined application. 11.
- Backup: External hard drive, minimum100 gigabyte, with automated backup software providing 12. daily backups.

3.3 SUPPORT FACILITIES INSTALLATION

- А. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) 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. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- Β. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. 2. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - Maintain access for fire-fighting equipment and access to fire hydrants.
- Parking: Provide temporary parking areas for construction personnel. Parking spaces are limited to spaces C. directly in front of the project site, Jefferson Street and existing spaces along York Street Lane.
- Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain D. Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
- E. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 - Identification Signs: Provide Project identification signs as indicated on Drawings. 1.
 - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - Provide temporary, directional signs for construction personnel and visitors. a.
 - 3. Maintain and touchup signs so they are legible at all times.
- F. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "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 Elevator Use: Section 142600 "Limited Use, Limited Application Elevator"
- I. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained. Any unimproved surfaces which are damaged are returned to their existing condition before use.
 - Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to 1. maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

SECURITY AND PROTECTION FACILITIES INSTALLATION 3.4

- Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other Α. improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- Β. 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.
 - Comply with work restrictions specified in Section 011000 "Summary." 1.

- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until
 - Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project. 3.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- Site Enclosure Fence: Before construction operations begin Contractor's option to furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by G. entrance gates.
 - Extent of Fence: Enclose entire project site including sidewalks to edge of curb and back to face of 1. building.
 - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel.
- Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day. H.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required J. by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary 1. enclosures.
- Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to L. protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - Prohibit smoking in construction areas. 1.
 - Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction. Develop and supervise an overall fire-prevention and -protection program for personnel at Project 2.
 - 3. site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating
 - 4. that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of A. mold that may appear during construction.
- Β. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

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- Protect porous materials from water damage. Protect stored and installed material from flowing or standing water.
- 1. 2. 3. Keep porous and organic materials from coming into prolonged contact with concrete.
- Remove standing water from decks. 4.
- 5. Keep deck openings covered or dammed.
- Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows: C.
 - Do not load or install drywall or other porous materials or components, or items with high organic 1. content, into partially enclosed building.
 - Keep interior spaces reasonably clean and protected from water damage.
 - 2. 3. 4. Periodically collect and remove waste containing cellulose or other organic matter. Discard or replace water-damaged material.

 - 5. Do not install material that is wet.
 - 6.
 - Discard, replace, or clean stored or installed material that begins to grow mold. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the 7. material in drywall or other interior finishes.
- Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows: D.
 - Control moisture and humidity inside building by maintaining effective dry-in conditions. 1.
 - Use permanent HVAC system to control humidity.
 - 2. 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are a. considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - Remove materials that can not be completely restored to their manufactured moisture level c. within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit Α. availability of temporary facilities to essential and intended uses.
- Β. Maintenance: Maintain facilities in good operating condition until removal. 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. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- 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. E. 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. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout" 2.
 - 3. Comply with final cleaning requirements specified in Section 017700 "Closeout period. Procedures.'

END OF SECTION 015000

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for 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 012500 "Substitution Procedures" for requests for substitutions.
 - 2. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 - 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 013300 "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 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. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 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.
 - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

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

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
 - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Architect will make selection.
 - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 - 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "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. 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.
 - 2. 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.
 - 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 - 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
 - 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

- 1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

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 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. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
 - 9. Correction of the Work.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for limits on use of Project site.
 - 2. Section 013300 "Submittal Procedures" for submitting surveys.
 - 3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 4. Section 024119 "Selective Structure Demolition" for demolition and removal of selected portions of the building.
 - 5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

A. Final Property Survey: Submit 5 copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and

support structural 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. Operational elements include the following:
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
- 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. Other construction elements include but are not limited to the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
- 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.
- C. 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 requirements in Section 018113.13 "Sustainable Design Requirements LEED for New Construction and Major Renovations."
- 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. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - 1. Description of the Work.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Architect that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."
- E. Surface and Substrate Preparation: Comply with manufacturer's written recommendations for preparation of substrates to receive subsequent work.

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. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. 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.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. 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.

- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

3.5 INSTALLATION

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

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

- 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. 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.
- F. 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.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 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.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 - 4. Ceilings: Patch, repair, or rehang 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.

G. 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 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 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 (27 deg C).
 - 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.
 - 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- 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 015000 "Temporary Facilities and Controls." Section 017419 "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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION 017300

CHATHAM COUNTY HUMAN RESOURCES OFFICE (2012-10) SAVANNAH, GEORGIA

SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

Β. **Related Requirements:**

- Section 024119 "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements. Section 042200 "Unit Masonry" for disposal requirements for masonry waste. 1.
- 2.

1.3 DEFINITIONS

- Construction Waste: Building and site improvement materials and other solid waste resulting from А. construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- Demolition Waste: Building and site improvement materials resulting from demolition or selective Β. demolition operations.
- Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or C. deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility. E.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

- General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous A. solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials., including the following:
 - 1. **Demolition Waste:**
 - Wood studs. a.
 - b. Wood trim.
 - c. d. Rough hardware.
 - Insulation.
 - Doors and frames. e.
 - f. Door hardware.
 - Glazing. g. h.
 - Equipment.
 - Cabinets. i. Plumbing fixtures.
 - J. k.
 - Piping. 1.
 - Supports and hangers.
 - m. Valves. n.
 - Sprinklers. Mechanical equipment.
 - 0.
 - Refrigerants. p. Electrical conduit.
 - q. Copper wiring. r.
 - Lighting fixtures. s.
 - t. Lamps.
 - Ballasts u.
 - Electrical devices. v.

- Regardless of salvage/recycle goal indicated in "General" paragraph above, salvage or recycle 100% or the following uncontaminated materials: w
 - concrete
 - concrete reinforcement steel
 - concrete masonry units
 - structural and miscellaneous steel
 - 2) 3) 4) 5) 6) 7) 8) metal and wood studs
 - wood trim/moldings
 - gypsum board
 - acoustical tile and panels
 - ðý carpet 10) carpet pad
- 2. Construction Waste:
 - Wood a.
 - b. Metals.
 - c. d. Roofing.
 - Insulation.
 - Carpet and pad. e. f.
 - Regardless of salvage/recycle goal indicated in "General" paragraph above, salvage or recycle 100% or the following uncontaminated materials:
 - Structural and miscellaneous steel
 - 2) 3) 4) 5) Concrete
 - Concrete reinforcing
 - Concrete masonry units
 - Gypsum board
 - 6) Wood/Metal studs
 - 7) Piping Electrical conduit 8)
 - Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, g. salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - Paper.
 - Cardboard.
 - Boxes.
 - 1) 2) 3) 4) 5) Plastic sheet and film.
 - Polystyrene packaging. 6)
 - Wood crates.
 - Plastic pails. 7)

1.5 ACTION SUBMITTALS

Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed. A.

INFORMATIONAL SUBMITTALS 1.6

- Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use А. Form CWM-3 for construction waste and Form CWM-4 for demolition waste. Include the following information:
 - Material category.
 - 2. 3. Generation point of waste.

 - 4.
 - 5. 6.
 - Total quantity of waste in tons. Quantity of waste salvaged, both estimated and actual in tons. Quantity of waste recycled, both estimated and actual in tons. Total quantity of waste recovered (salvaged plus recycled) in tons. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project Β. 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.
- 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 E. 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.
- LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste G. material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- Oualification Data: For waste management coordinator and refrigerant recovery technician. H.
- 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. I.

1.7 QUALITY ASSURANCE

- Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste Α. management coordination of projects with similar requirements, that employs a LEED-Accredited Professional.
- Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program. Β.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste D. management including, but not limited to, the following:
 - Review and discuss waste management plan including responsibilities of waste management 1. coordinator.
 - 2
 - Review requirements for documenting quantities of each type of waste and its disposition. Review and finalize procedures for materials separation and verify availability of containers and bins 3. needed to avoid delays.
 - Review procedures for periodic waste collection and transportation to recycling and disposal 4. facilities.
 - 5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

- General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. A. 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.
- Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-1 for construction waste and Form CWM-2 for demolition Β. waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 - 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. 1.
 - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include
 - list of their names, addresses, and telephone numbers. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers. Recycled Materials: Include list of local receivers and processors and type of recycled materials 3.
 - 4.
 - each will accept. Include names, addresses, and telephone numbers. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility. 5.
 - 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 6. separation will be performed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- General: Implement approved waste management plan. Provide handling, containers, storage, signage, A. transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - Comply with operation, termination, and removal requirements in Section 015000 "Temporary 1. Facilities and Controls.
- Β. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
 - 1.
 - Distribute waste management plan to everyone concerned within three days of submittal return. Distribute waste management plan to entities when they first begin work on-site. Review plan 2. procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be
 - Salvaged, recycled, reused, donated, and sold. Comply with Section 015000 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control. 2.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Sale and Donation: Not permitted on Project site.
- Β. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 - 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. Transport items to Owner's storage area designated by Owner. 4.
 - Protect items from damage during transport and storage.
- C. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- D. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- Plumbing Fixtures: Separate by type and size. E.
- F. Lighting Fixtures: Separate lamps by type and protect from breakage.
- G. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- General: Recycle paper and beverage containers used by on-site workers. A.
- Β. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- C. 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.
- Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable D. waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - Provide appropriately marked containers or bins for controlling recyclable waste until removed from 1. Project site. Include list of acceptable and unacceptable materials at each container and bin.

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- Inspect containers and bins for contamination and remove contaminated materials if found. a.
- Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust. Stockpile materials away from construction area. Do not store within drip line of remaining trees. 2.
- 3. Store components off the ground and protect from the weather. Remove recyclable waste from Owner's property and transport to recycling receiver or processor. 4.
- 5

3.4 RECYCLING DEMOLITION WASTE

- Concrete: Remove reinforcement and other metals from concrete and sort with other metals. A.
 - 1. Pulverize concrete to maximum 4-inch size.
- Β. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-1/2-inch size.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- D. Metals: Separate metals by type.
 - 1. 2. Structural Steel: Stack members according to size, type of member, and length.
 - Remove and dispose of bolts, nuts, washers, and other rough hardware.
- E. 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.
- F. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- G. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- H. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation 1. Agency or carpet recycler.
- Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, I. sprinklers, and other components by type and size.
- J. Conduit: Reduce conduit to straight lengths and store by type and size.
- 3.5 RECYCLING CONSTRUCTION WASTE
 - A. Packaging:
 - Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location. Polystyrene Packaging: Separate and bag materials. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. 1.
 - 2. 3. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - Crates: Break down crates into component wood pieces and comply with requirements for recycling 4. wood.
 - B. Wood Materials:
 - Clean Cut-Offs of Lumber: Grind or chip into small pieces. 1.
 - $\overline{2}$ 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.
 - Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer 1. mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

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

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- 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.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.7 ATTACHMENTS

- A. Form CWM-1 for construction waste reduction work plan.
- B. Form CWM-2 for demolition waste reduction work plan.
- C. Form CWM-3 for construction waste
- D. Form CWM-4 for demolition waste.

END OF SECTION 017419

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for 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 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 017300 "Execution" for progress cleaning of Project site.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 ACTION SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.
- 1.5 MAINTENANCE MATERIAL SUBMITTALS
 - A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 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 21 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

- 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
- 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
- 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
- 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
- 5. Submit test/adjust/balance records.
- 6. Submit sustainable design submittals required in Section 018113.13 "Sustainable Design Requirements LEED for New Construction and Major Renovations," and in individual Sections.
- 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 14 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 017900 "Demonstration and Training."
 - 6. Advise Owner of changeover in heat and other utilities.
 - 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 - 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 9. Complete final cleaning requirements, including touchup painting.
 - 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 14 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
 - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 - 2. Results of completed inspection will form the basis of requirements for final completion.

1.7 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 012900 "Payment Procedures."
 - 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

- 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- 4. Submit pest-control final inspection report.
- 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 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. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.
 - 4. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated file.
 - b. Three paper copies. Architect will return two copies.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- 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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - 1. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls." Section 017419 "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.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer Comments on draft submittals.
 - 2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Authority will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

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

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- B. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for Construction Manager.
 - 7. Name and contact information for Architect.
 - 8. Name and contact information for Commissioning Authority.
 - 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 - 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
 - 1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
 - 1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
 - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 - 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 - 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 - 1. Type of emergency.
 - 2. Emergency instructions.
 - 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 - 1. Fire.
 - 2. Flood.
 - 3. Gas leak.
 - 4. Water leak.
 - 5. Power failure.
 - 6. Water outage.
 - 7. System, subsystem, or equipment failure.
 - 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.

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- 3. Operating instructions for conditions outside normal operating limits.
- 4. Required sequences for electric or electronic systems.
- 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:

- 1. Product name and model number.
- 2. Manufacturer's name.
- 3. Color, pattern, and texture.
- 4. Material and chemical composition.
- 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 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.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 017300 "Execution" for final property survey.
 - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set(s) of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit record digital data files in pdf format.
 - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit three paper copy of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit three paper copy of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an 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 archive 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 below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - 1. 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: Scanned PDF electronic file of marked-up record prints.
 - 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 and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 - 2. Format: 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.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
 - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 - 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 - 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 - 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

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

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

- 3.1 RECORDING AND MAINTENANCE
 - A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

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

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 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.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. Identification: On each copy, provide an applied label with the following information:
 - a. Name of Project.
 - b. Name and address of videographer.
 - c. Name of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Date of video recording.
 - 2. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals in PDF electronic file format on compact disc.

1.5 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 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.6 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 has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project record documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.

- e. Sequences for electric or electronic systems.
- f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - 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.
 - 1. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- 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, 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. 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.

3.3 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. Video: Provide minimum 640 x 480 video resolution converted to .mp4 format file type, on electronic media.
 - 1. Electronic Media: Read-only format compact disc acceptable to Owner, with commercial-grade graphic label.
 - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
 - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
 - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. E-mail address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
 - 1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
 - 1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 017900

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SECTION 018113 - SUSTAINABLE DESIGN REQUIREMENTS - LEED FOR COMMERCIAL INTERIORS

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 general requirements and procedures for compliance with certain USGBC LEED prerequisites and credits needed for Project to obtain LEED Silver certification based on the USGBC's "LEED 2009 for Commercial Interiors."
 - 1. Other LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests and comparable product requests.
 - evaluate substitution requests and comparable product requests.
 Additional LEED prerequisites and credits needed to obtain the indicated LEED certification depend on Architect's design and other aspects of Project that are not part of the Work of the Contract
 - on Architect's design and other aspects of Project that are not part of the Work of the Contract.
 A copy of the LEED Project checklist is attached at the end of this Section for information only.

1.3 DEFINITIONS

Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site. If only a fraction of a product or material is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value. A.

- B. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 - 1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Pre-consumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the project's LEED certification application. Document responses as informational submittals.

1.5 ACTION SUBMITTALS

- A. General: Submit additional LEED submittals required by other Specification Sections.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. LEED Documentation Submittals:
 - Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal."
 Credit MR 4: Product data and certification letter from product manufacturers indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating material costs for each product having recycled content.
 - 3. Credit MR 5: Product data indicating location of material manufacturer for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material and for each regionally extracted and manufactured material.
 - a. Include statement indicating distance from manufacturer to Project for each regionally manufactured material.
 - b. Include statement indicating location of and distance from Project to point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials.
 - 4. Credit IEQ 3.1:

- Construction indoor-air-quality management plan. a.
- Product data for temporary filtration media. b.
- c.
- Product data for filtration media used during occupancy. Construction Documentation: Six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, d. documenting implementation of the indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.
- 5.
- 6.
- Credit IEQ 4.1: Product data for adhesives and sealants used inside the weatherproofing system indicating VOC content of each product used. Credit IEQ 4.2: Product data for paints and coatings used inside the weatherproofing system indicating VOC content of each product used. Credit IEQ 4.4: Product data for products containing composite wood or agrifiber products or wood glues indicating that they do not contain urea-formaldehyde resin. 7.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For LEED coordinator.
- Project Materials Cost Data: Provide statement indicating total cost for materials used for Project. Costs Β. exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
 - Furniture. 1.
 - Plumbing.
 - 2. 3. Mechanical.
 - 4. Electrical.
 - 5. Specialty items such as elevators and equipment. Wood-based construction materials.
 - 6.
- C. LEED Action Plans: Provide preliminary submittals within 14 days and 60 days for MR4 and MR5 of date established for the Notice to Proceed indicating how the following requirements will be met:
 - Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste 1. Management and Disposal."
 - 2. Credit MR 4: List of proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content. Credit MR 5: List of proposed regionally manufactured materials and regionally extracted and
 - 3. manufactured materials.
 - Identify each regionally manufactured material, including its source and cost. a.
 - Identify each regionally extracted and manufactured material, including its source and cost. b.
 - 4. Credit MR 7: List of proposed certified wood products. Indicate each product containing certified wood, including its source and cost of certified wood products. Credit IEQ 3.1: Construction indoor-air-quality management plan.
 - 5.
- LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual D. construction and purchasing activities with LEED action plans for the following:
 - Credit MR 2: Waste reduction progress reports complying with Section 017419 "Construction Waste Management and Disposal." 1.
 - 2
 - Credit MR 4: Recycled content. Credit MR 5: Regionally manufactured materials and regionally extracted and manufactured 3. materials.

1.7 QUALITY ASSURANCE

LEED Coordinator: Engage an experienced LEED-Accredited Professional to coordinate LEED A. requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

- 2.1MATERIALS, GENERAL
 - Α. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to LEED credits, the Contractor shall determine additional materials and procedures necessary to obtain LEED credits indicated.

2.2 RECYCLED CONTENT OF MATERIALS

- A. Credit MR 4: Building materials shall have recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content for Project constitutes a minimum of 10 20 percent of cost of materials used for Project.
 - Cost of post-consumer recycled content plus one-half of pre-consumer recycled content of an item 1. shall be determined by dividing weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by total weight of the item and multiplying by cost of the item.
 - 2. Do not include plumbing, mechanical and electrical components, and specialty items such as elevators and equipment in the calculation.

2.3 REGIONAL MATERIALS

Credit MR 5, Option 1: Not less than 20 percent of materials (by cost) shall be regionally manufactured A. materials.

2.4LOW-EMITTING MATERIALS

- Credit IEQ 4.1: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D A. (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. 3. 4. 5. Metal-to-Metal Adhesives: 30 g/L.
 - Adhesives for Porous Materials (Except Wood): 50 g/L. Subfloor Adhesives: 50 g/L.

 - Plastic Foam Adhesives: 50 g/L.
 - 6. 7.

 - Carpet Adhesives: 50 g/L. Carpet Pad Adhesives: 50 g/L. VCT and Asphalt Tile Adhesives: 50 g/L. 8.
 - 9.
 - Cove Base Adhesives: 50 g/L. Gypsum Board and Panel Adhesives: 50 g/L. Rubber Floor Adhesives: 60 g/L. Ceramic Tile Adhesives: 65 g/L. 10.
 - 11.
 - 12. 13.
 - Multipurpose Construction Adhesives: 70 g/L. Fiberglass Adhesives: 80 g/L. Contact Adhesive: 80 g/L. Structural Glazing Adhesives: 100 g/L. Wood Flooring Adhesive: 100 g/L. Structural Wood Member Adhesive: 140 g/L.
 - 14.
 - 15.
 - 16.
 - 17.
 - 18.
 - 19. Single-Ply Roof Membrane Adhesive: 250 g/L.
 - Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, 20. metal, unsupported vinyl, rubber, or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
 - 21.
 - Top and Trim Adhesive: 250 g/L. Plastic Cement Welding Compounds: 250 g/L. ABS Welding Compounds: 325 g/L. CPVC Welding Compounds: 490 g/L. PVC Welding Compounds: 510 g/L. Adhesive Primer for Plastic: 550 g/L.
 - 22. 23.
 - 24.
 - 25. 26.

 - 27.
 - 28.
 - 29.
 - Adnesive Primer for Plastic: 550 g/L. Sheet-Applied Rubber Lining Adhesive: 850 g/L. Aerosol Adhesive, General-Purpose Mist Spray: 65 percent by weight. Aerosol Adhesive, General-Purpose Web Spray: 55 percent by weight. Special-Purpose Aerosol Adhesive (All Types): 70 percent by weight. Other Adhesives: 250 g/L. Architectural Sealants: 250 g/L. Nonmembrane Roof Sealants: 300 g/L. Single Ply Roof Membrane Sealants: 450 g/L 30.
 - 31.
 - 32.
 - 33.
 - Single-Ply Roof Membrane Sealants: 450 g/L. Other Sealants: 420 g/L. 34.
 - 35.
 - 36. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 37.
 - Sealant Primers for Porous Substrates: 775 g/L. Modified Bituminous Sealant Primers: 500 g/L. 38.
 - 39. Other Sealant Primers: 750 g/L.
- Β. Credit IEQ 4.2: For field applications that are inside the weatherproofing system, paints and coatings shall comply with the following VOC content limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - Flat Paints and Coatings: VOC not more than 50 g/L. Nonflat Paints and Coatings: VOC not more than 150 g/L. 1.
 - 2.3.
 - Dry-Fog Coatings: VOC not more than 400 g/L.

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- Primers, Sealers, and Undercoaters: VOC not more than 200 g/L. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L. Zinc-Rich Industrial Maintenance Primers: VOC not more than 340 g/L. 5.
- 6. 7.
- Zinc-Rich Industrial Maintenance Primers: VOC not more than Pretreatment Wash Primers: VOC not more than 420 g/L. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L. Floor Coatings: VOC not more than 100 g/L. Shellacs, Clear: VOC not more than 730 g/L. Shellacs, Pigmented: VOC not more than 550 g/L. Stains: VOC not more than 250 g/L. 8.
- 10.
- 11.
- 12.
- 13.
- C. Credit IEQ 4.4: Composite wood, agrifiber products, and adhesives shall not contain urea-formaldehyde resin.

PART 3 - EXECUTION

- 3.1 REFRIGERANT REMOVAL
 - Prerequisite EA 3: Remove CFC-based refrigerants from existing HVAC&R equipment indicated to remain and replace with refrigerants that are not CFC based. Replace or adjust existing equipment to accommodate A. new refrigerant as described in HVAC Sections.
- 3.2 CONSTRUCTION WASTE MANAGEMENT
 - Credit MR 2: Comply with Section 017419 "Construction Waste Management and Disposal." A.
- CONSTRUCTION INDOOR-AIR-QUALITY MANAGEMENT 3.3
 - Credit IEQ 3.1: Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under A. Construction.'
 - If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 015000 "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system 1. used during construction.
 - Replace all air filters immediately prior to occupancy. 2.

END OF SECTION 018113.16

SECTION 019113 - COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The Commissioning process begins at project inception (during the pre-design phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the owner's project requirements. Commissioning shall:
- B. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards.
- C. Verify and document proper performance of equipment and systems.
- D. The commissioning team is made up of the contracted commissioning agent (CxA) as well as representatives from the Owner, architect, design engineers, general contractor, sub-contractors of certain construction trades and major equipment suppliers. The lead person for each trade who will actually perform and/or supervise the work shall be the designated representative to the commissioning team. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- E. The CxA shall have the responsibility for coordinating each step of the commissioning process. The trade representatives shall perform the tasks required in each step as described in this section.
- F. Work under this contract shall conform to Division 01 General Requirements.

1.3 RELATED SECTIONS

- A. SECTION 220800 "Plumbing Commissioning Requirements"
- B. SECTION 260800 "Electrical Commissioning Requirements"

1.4 ABBREVIATIONS & DEFINITIONS

- A. Approval acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.
- B. Basis of Design (BOD) documentation of the primary thought processes and assumptions behind the design decisions that were made to meet the Owner's Project Requirements. The Basis of Design describes the systems, components, conditions, and methods chosen to meet these requirements.
- C. Commissioning (Cx) a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria.

- D. Commissioning Agent (CxA) an independent agent not otherwise associated with the A/E team members or the Contractor. The CxA directs and coordinates the day-to-day commissioning activities.
- E. Commissioning Plan an overall plan that provides the structure, schedule and coordination planning for the commissioning process.
- F. Deficiency a condition in the installation or function of a component, piece of equipment, or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).
- G. Design Intent the ideas, concepts and criteria that are considered to be very important to the Owner. It is initially the outcome of the programming and conceptual design phases.
- H. Functional Performance Test (FPT) test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Systems are tested under various modes, such as during low load conditions, component failures, unoccupied mode, power failure, etc. The commissioning agent develops the functional performance test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FPTs are performed after pre-functional checklists and startup is complete.
- I. Mechanical, Electrical, and Plumbing (MEP)
- J. Monitoring the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data-loggers or the trending capabilities of building's energy management system.
- K. Non-Compliance (also Non-Conformance) a condition in the installation or function of a component, piece of equipment or system that does not perform properly or is not complying with the design intent.
- L. Owner's Project Requirements (OPR) document outlining the owner's expectations and goals for the performance of the building upon project completion.
- M. Phased Commissioning Commissioning that is completed in phases due to construction scheduling issues.
- N. Pre-Start / Start-Up Checklist a list of items to inspect and elementary component tests to conduct to verify proper installation of equipment, provided by the CxA to the MEP Contractors. This checklist consists primarily of static inspections and procedures to prepare the equipment or system for initial operation (e.g. belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated etc.). However, some checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system).
- O. Simulated Condition condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
- P. Start-up the initial starting or activating of dynamic equipment including executing the Pre- Start / Start-Up checklist.
- Q. Test procedure the step-by-step process which must be executed to fulfill the test requirements specifying what modes and functions, etc. shall be tested.

1.5 SYSTEMS TO BE COMMISSIONED

- A. The following systems are to be commissioned for this project:
 - 1. Domestic Hot Water Systems
 - 2. Lighting and Lighting Controls

1.6 ROLES AND RESPONSIBILITIES

- A. The following describes the roles of the trade contractors in the commissioning process.
 - 1. General Contractor
 - a Include the cost for commissioning requirements in the contract price.
 - b Include commissioning requirements in the mechanical, electrical, controls and other appropriate sub-contracts.
 - c Ensure acceptable representation, with the means and authority to prepare and coordinate execution of the commissioning plan.
 - d Remedy deficiencies identified during the verification test and FPT process.
 - 2. Mechanical Contractor
 - a Include cost for commissioning requirements in the contract price.
 - b Include requirements for copies of documents and training in each sub-contract.
 - c Ensure representation and cooperation of applicable trade contractors.
 - d Ensure participation of equipment manufacturers and/or suppliers representatives in appropriate testing and training activities.
 - e Attend commissioning coordination meeting with CxA.
 - f Prepare and provide construction schedule to CxA, including estimated equipment delivery dates, pipe system testing, and equipment start-up. Update schedule as appropriate and notify CxA of these updates throughout construction process.
 - g Gather submittals from equipment manufacturers and provide to CxA prior to installation.
 - h Conduct mechanical system orientation and inspection at the completion of mechanical equipment placement. For phased scheduling, conduct multiple orientation and inspections as appropriate.
 - i Update drawings to record current condition (continual as-builts).
 - j Notify CxA at least two weeks prior to system start-up and testing. Perform start-up and testing with CxA present.
 - k Notify CxA at least two weeks prior to commencement of TAB services.
 - 1 Coordinate timing of FPTs with CxA. Perform FPTs with CxA present.
 - m Gather O&M data for all equipment and provide a copy to CxA prior to completion of construction.
 - n Participate in training sessions.
 - o Provide CxA with certificate of readiness stating all HVAC systems are complete and have been tested in accordance with functional performance testing procedures.
 - p Provide a complete set of as-built records to the CxA at completion of Work.
 - 3. Electrical Contractor
 - a Include cost for commissioning requirements in the contract price.
 - b Attend commissioning coordination meeting with CxA.
 - c Provide copy of submittals for automatic lighting equipment and materials to CxA.
 - d Provide anticipated schedule for installation and programming.
 - e Conduct tests of system performance through all modes of operation with CxA present.
 - f The following paragraphs present a brief description of the responsibilities of parties outside of trade divisions. These descriptions are provided to assist the trade contractors in their understanding of the overall commissioning process

- 4. Owner
 - a Provide Owner's Project Requirements (OPR) on which design is based.
 - b Identify and assign a representative who has the authority to make decisions in a timely manner regarding the commissioning process.
 - c Assign maintenance personnel to participate in the commissioning process.
- 5. Commissioning Agent
 - a Develops and executes the Commissioning Plan through the organization of meetings, observation of the construction, presence at tests described in the Plan and coordination of commissioning document development.
- 6. Architect
 - a Provide Design Intent and Basis of Design information that developed from the Owner's Requirements.
 - b Incorporate text into appropriate sections of the specifications which alert the contractor(s) of their commissioning responsibilities.
- 7. Mechanical Designer
 - a Provide Design Intent and Basis of Design information that developed from the Owner's Requirements.
 - b Incorporate text into appropriate sections of the specifications which alert the contractor(s) of their commissioning responsibilities.

1.7 QUALITY ASSURANCE

- A. Appropriate personnel (i.e. Project Manager and/or Field Foreman) in the employ of the Mechanical Contractor and certain Trades Contractors shall assist the CxA in coordinating and executing the required commissioning activities. These personnel shall become familiar with the Commissioning Plan and shall coordinate the tasks, documentation and submissions required by this Plan. These personnel shall review these documents for compliance with the commissioning requirements and shall arrange for remedies to deficiencies noted in these documents.
- B. The Owner will engage an independent Commissioning Agent (CxA). The Contractor shall properly coordinate with the CxA throughout the construction of the project.
- C. The CxA will be an objective advocate of the Owner observing the commissioning activities of the Contractor and will make final recommendations to the Owner regarding functional performance of the commissioned building systems. The CxA will prepare a Commissioning Plan for coordination with the design/build team to assure an efficient design and construction process that provides verification to the Owner through a seamless commissioning process which blends their activities into the overall project schedule.
- D. All submittal data for systems and components to be commissioned shall be submitted to the CxA for use in the Cx process. The Contractor shall submit additional copies of submittals for the use in the Commissioning process.
- E. The Contractor shall schedule the work taking into account the activities to be performed by the Commissioning Agent. No claim for delay or request for an extension of Contract Time will be allowed as the result of the scheduled activities of the Commissioning Agent.

1.8 DOCUMENTATION

A. Owner's Project Requirements (OPR): A written document, prepared by the owner, outlining the owner's expectations and goals for the performance of the building upon project completion.

- B. Basis of Design (BOD): A written document, prepared by the Architect and design team, outlining the primary thought processes and assumptions behind the design decisions that were made to meet the Owner's Project Requirements. The Basis of Design describes the systems, components, conditions, and methods chosen to meet these requirements.
- C. Commissioning Plan: An overall plan, prepared by the CxA, that provides the structure, schedule and coordination planning for the commissioning process.
- D. Pre-Start / Start-Up Checklists and Functional Performance Test Procedures: The CxA shall develop Pre-Start / Start-Up checklists and FPT Procedures for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested.
- E. Test Reports: The CxA shall record test data, observations, and measurements on test procedures and test logs. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test reports and include them in systems manual and commissioning report.
- F. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.
- G. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are in variance with the OPR, BOD, and Contract Documents.
- H. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing in accordance with the OPR, BOD, and Contract Documents.
- I. The Mechanical, Electrical and Plumbing Contractors shall provide copies of documents gathered or developed during the construction process to the Commissioning Agent in a timely and accurate manner. Where documents are developed by a Trades Contractor, Mechanical Contractor shall make sure that those documents are provided to the Commissioning Agent. The documents required are:
 - 1. Construction schedule, including estimated dates for equipment delivery, system testing, and equipment start-up. Provide updated schedules as appropriate.
 - 2. Procedures and status reports, including deficiencies noted.
 - 3. Minutes from all meetings concerning MEP contractors and/or the commissioning process.
 - 4. All manufacturer's equipment submittals showing the manufacturer and model number, installation and start-up instructions, sequence of operation, performance data, performance test procedures and controls drawings.
 - 5. Field checkout sheets to be used by the factory or field technicians.
 - 6. As-built records.
 - 7. Posted systems diagrams.
 - 8. Any of the above documents created by Trades Contractors that and are not contracted through the Mechanical Contractor. For example, the Owner is considering contracting directly with a TAB Contractor. If this occurs, the TAB Contractor will be responsible for providing the TAB report to the CxA.

PART 2 - PRODUCTS

2.1 TOOLS AND EQUIPMENT

- A. The appropriate Trades Contractor shall furnish all special tools and equipment required during the commissioning process. The owner shall furnish necessary utilities for the commissioning process.
- B. Proprietary test equipment and software required by any equipment manufacturer for programming and/or start-up, whether specified or not, shall be provided by the manufacturer of the equipment. Manufacturer shall provide the test equipment, demonstrate its use, and assist in the commissioning process as needed.

PART 3 - EXECUTION

3.1 GENERAL

- A. A commissioning kickoff meeting with all commissioning team members shall be held at a time and place designated by the Owner. The purpose of this meeting shall be to familiarize all parties with the commissioning process, and to ensure that the responsibilities of each party are clearly understood.
- B. MEP Contractors shall complete all phases of work so the systems can be started, tested, balanced, and acceptance procedures undertaken. This includes the complete installation of all equipment, materials, pipe, duct, wire, insulation, controls, etc., per the contract documents and related directives, clarifications, and change orders.
- C. MEP Contractors shall assist the CxA in preparing the Commissioning Plan by providing pertinent information pertaining to the actual equipment and installation. If changes have been made to the contract schedule that alters the commissioning process, Mechanical Contractor shall notify CxA immediately.
- D. Acceptance procedures are normally intended to begin prior to completion of a system and/or subsystems. Start of acceptance procedures before system completion does not relieve the contractor from completing those systems as per the schedule.

3.2 PARTICIPATION IN ACCEPTANCE PROCEDURES

- A. Contractors shall notify CxA when systems are ready for testing, including Pre-Start, Start-Up and Functional Performance Tests and final commissioning verification. Contractor shall provide completed commissioning data sheets to CxA as appropriate for each stage of the commissioning process.
- B. The Contractors shall provide skilled technicians to start-up and debug all systems. These same technicians shall be made available to assist the CxA in completing the commissioning program. Work schedules, time required for testing, etc., shall be requested by the CxA and coordinated by the contractor. Contractor shall ensure that the qualified technician(s) are available and present during the agreed upon schedules and of sufficient duration to complete the necessary tests, adjustments, and/or problem resolutions.
- C. System performance problems and discrepancies may require additional technician time, CxA time, reconstruction of systems, and/or replacement of system components. The additional technician time shall be made available for subsequent commissioning periods until the required system performance is obtained.
D. Qualifications of technicians shall include expert knowledge relative to the specific equipment involved and a willingness to work with the CxA. The CxA reserves the right to question the appropriateness and qualifications of the technicians relative to each item of equipment, system, and/or sub-system.

3.3 PRE-START / START-UP TESTS

- A. Pre-Start / Start-Up tests are operating tests and checks to verify that all components, equipment, systems, sub-systems, and interfaces between systems, operate in accordance with contract documents. These tests include all operating modes, interlocks, specified control responses, specific responses to abnormal or emergency conditions and verification of the proper response of the building automation system controllers and sensors.
- B. Calibration of all sensors shall be conducted as part of these tests.
- C. MEP Contractors and appropriate subs shall provide the services of a technician(s) who is (are) familiar with the construction and operation of the system(s) being tested. Provide access to the contract plans, shop drawings, and equipment cut sheets of all installed equipment. Provide details of the control system, schematics, and a narrative description of control sequences of operation.
- D. Electrical contractor will provide a foreman electrician familiar with the electrical interlocks, interfaces with emergency power supply, and interfaces with alarm and life-safety systems. Provide access to the contract plans, and all as-built drawings of sub-systems, interfaces, and interlocks.
- E. Provide checklists for each component, piece of equipment, system, and sub-system, including all interface interlocks, etc. Manufacturer's standard written start-up and check-out procedures are acceptable. These checklists should include lines for recording the checking and outcome of each procedure and should include a summary area with signature block.
- F. All test procedures and data sheets shall be submitted to the design professional for review and acceptance.
- G. Contractor shall perform the following tests and checks. The CxA shall direct and witness the tests and check all equipment and systems.
 - 1. Set the system equipment (i.e., pumps, fans, etc.) into the operations mode to be tested, i.e. normal, shut down, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions, in turn.
 - 2. Allow the Commissioning Agent to inspect and verify the position of each device and interlock identified on the checklist. Each item shall be signed off as acceptable (yes), or failed (no).
 - 3. This test shall be repeated for each operating cycle that applies to the mechanical system to be tested.
 - 4. Perform operating tests with Commissioning Agent present. Operating checks shall include all safety cutouts, alarms, and interlocks with smoke control and life safety systems during all modes of operation of the mechanical system.
 - 5. If during a test an operating deficiency is observed, Contractor and Commissioning Agent shall discuss, remedy and document.

3.4 FUNCTIONAL PERFORMANCE TESTING

- A. The objective of functional performance tests is to determine if each HVAC system operates in accordance with the documented design intent and contract documents.
- B. Contractor(s) shall provide CxA with the necessary documents, as listed in Paragraph 1.7 prior to starting Functional Performance Tests.

- C. Participants in the functional performance tests shall be the same as those listed in the verification tests.
- D. The CxA shall supervise and direct all functional performance tests.
- E. Each test shall be performed under conditions that simulate actual conditions as close as practicable. The Trades Contractor executing the test shall provide all materials and system modifications necessary to simulate the required conditions. At completion of the test, the Trades Contractor shall
- F. A preliminary functional performance test report shall be prepared by the CxA and submitted to the appropriate design professional (Architect, Mechanical Designer or Electrical Designer) for review. Any identified deficiencies need to be evaluated by the design professional and General Contractor to determine if they are part of the contractor's or sub-contractor's contractual obligations. Construction deficiencies shall be corrected by the responsible contractor(s), and the specific functional performance test repeated.
- G. If it is determined that that an MEP system is constructed in accordance with the contract documents, and the performance deficiencies are not part of the contract documents, the owner must decide whether any required modifications needed to bring the performance design intent shall be implemented, or if the test shall be accepted as submitted. If corrective work is performed, the owner shall determine if a portion or all required functional performance tests should be repeated, and a revised report submitted.

3.5 DEFICIENCY RESOLUTION

- A. Deficiencies identified during commissioning process may result in additional work being required to commission the systems. The Owner and/or Architect shall have final jurisdiction over any additional work done to achieve performance.
- B. Re-testing may be required after system adjustments and/or replacements are completed. The contractor(s) and suppliers shall include a reasonable reserve to complete this work as part of their contractual obligations.

END OF SECTION - 019113

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. 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 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 017300 "Execution" for cutting and patching procedures.

1.3 DEFINITIONS

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

1.4 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.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

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- C. Predemolition Photographs or Video: 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.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- 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.

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 so as not to void existing warranties. Notify warrantor before proceeding.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE 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 ANSI/ASSE A10.6 and NFPA 241.
- C. LEED Requirements for Building Reuse:
 - 1. Credit MR 1.2: Maintain at least 60% by area of the existing non-shell, non structural components (i.e. walls, flooring, and ceiling systems). Do not demolish existing construction beyond indicated limits.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011000 "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated 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. Arrange to shut off indicated utilities with utility companies.
 - 3. 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.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated 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.
 - 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.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

- 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
- 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
- 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
- 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. 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, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. 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 fire watch and portable fire-suppression devices during 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 017419 "Construction Waste Management and Disposal."
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of nonstructural building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
 - 1. Percentage of non-structural building retained: 60 percent.
- 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 off-site at location 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.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section 075216- Styrene-butadiene styrene (SBS) modified bituminous membrane roofing" for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow demolished materials to accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 024119

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 WORK INCLUDED

A. Provide all cast-in-place concrete, complete, in place, as indicated on the Drawings, specified herein and required for the complete installation.

1.3 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcing, mix design, placement procedures, and finishes.
- B. Cast-in-place concrete includes the following:
 - 1. Foundations and footings.
 - 2. Slabs-on-grade.
 - 3. Foundation walls.
 - 4. Load-bearing building walls.
 - 5. Equipment pads and bases.

1.4 SUBMITTALS

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, and others if requested by Architect.
- C. Shop drawings for Concrete Reinforcement:
 - 1. Shop drawings shall be submitted by the Contractor to the Architect and review action received prior to fabrication. When corrections are required, copies will be returned noting such. Drawings shall then be corrected and resubmitted until final review action is received. Coordination of shop drawing shall be such that corrections noted on one sheet that affects another drawing will be transmitted and made on all sheets and also resubmitted.
 - 2. Shop drawings shall also include:
 - a. Location of all proposed construction joints, keying and waterstops;
 - b. Location of all openings, depressions, construction and control joints, trenches, sleeves, inserts and items affecting the reinforcement and placing of concrete.
 - 3. The Contractor shall be responsible for checking quantities and dimensions in accordance with contract drawings. Where discrepancies in dimensions are noted, the Contractor shall notify the Architect of such discrepancies and corrected dimensions will then be furnished by the Architect. Corrected dimensions shall be reflected on shop drawings.
 - 4. Contract drawings receive precedence over shop drawings unless otherwise authorized in writing.
 - 5. Shop drawings furnished for reinforcing steel shall contain fabrication details as well as placement drawings which are to be used in conjunction with contract drawings.
 - 6. Detailing and fabrication of reinforcing shall conform to ACI "Manual of Standard Practice for Detailing Reinforced Concrete Structures", (ACI 315-05).

- D. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:
 - 1. Color finishes.
 - 2. Normal weight aggregates.
 - 3. Reglets.
 - 4. Waterstops.
 - 5. Vapor barrier.
 - 6. Form liners.
- E. Submit 5 copies of laboratory test reports for concrete materials and mix design test. All concrete mix designs shall be prepared by a qualified testing laboratory.
- F. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.
- G. Review Action: Submittals are reviewed for general conformance with the design concept only and are subject to all requirements of the contract documents. Contractor is responsible for dimensions, quantities and coordination with other trades. Reviews do not authorize any changes involving additional cost unless stated in separate letter or change order.
- H. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of the following codes, specifications, and standards, except where more stringent requirements are shown or specified:
 - 1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
 - 2. ACI 311.4R-05, "Guide for Concrete Inspection."
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 4. ACI 304R-00, "Guide for Measuring, Mixing, Transporting and Placing Concrete."
 - 5. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
- B. Concrete Testing Service:
 - 1. All testing services specified in this section of these specifications shall be performed by a recognized, independent laboratory approved by the Architect.
 - 2. All expenses of the testing agency shall be borne by the Contractor.
 - 3. The Contractor shall furnish to the testing agency samples of all proposed material to be used which requires testing.
 - 4. Testing agency shall check and review proposed materials to be used for compliance with these specifications, perform all testing in accordance with referenced standards and provide all reports.
 - 5. Contractor shall furnish all project specifications, testing material, mill reports, design mixes and cylinders, and shall notify laboratory of concrete pouring schedules so as not to delay progress of the work.
 - 6. No material or mixes shall be used on project unless approved by the Architect.
 - 7. Materials and installed work may require testing and retesting, as directed by the Architect, at

anytime during the progress of the work. Allow free access to material stockpiles and facilities at all times. Retesting of rejected material and installed work, shall be provided at the Contractor's expense.

- C. Tests for Concrete Materials:
 - 1. Portland cement shall be sampled and tested to determine the properties in accordance with ASTM C 150-05.
 - 2. Aggregates shall be sampled and tested in accordance with ASTM C 33-92 (normal weight).
- D. Supervision: All reinforced concrete construction shall be performed under the personal supervision of the contractor's superintendent. This superintendent shall keep a record of all concrete poured on the job. The record shall show in detail the area poured, the time and date of the pour and weather conditions which existed at the time of the pour. Upon completion of the work, this record shall be turned over to the Architect.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Forms for Exposed Finish Concrete: Plywood, metal, metal-framed plywood faced, or other acceptable panel-type materials to provide continuous, straight, smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings.
- B. Forms for Unexposed Finish Concrete: Plywood, lumber, metal, or another acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration to match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners.
- D. Form Release Agent: Provide commercial formulation form release agent with a maximum of 350 mg/l volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
- E. Form Ties:
 - 1. Factory-fabricated, adjustable-length, removable or snap-off metal form ties designed to prevent form deflection and to prevent spalling of concrete upon removal. Provide units that will leave no metal closer than 1-1/2 inches to the plane of the exposed concrete surface.
 - 2. Provide ties that, when removed, will leave holes not larger than 1 inch in diameter in the concrete surface.

2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
- B. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- C. Welded Wire Fabric: ASTM A 185, welded steel wire fabric.
- D. Deformed-Steel Welded Wire Fabric: ASTM A 497.
- E. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Use wire bar-type supports complying with CRSI specifications.

- 1. For slabs-on-grade, including thickened slab areas, use supports with sand plates or horizontal runners where base material will not support chair legs.
- 2. For exposed-to-view concrete surfaces where legs of supports are in contact with forms, provide supports with legs that are protected by plastic (CRSI, Class 1) or stainless steel (CRSI, Class 2).
- 3. For foundations, support reinforcing in bottom at footings with whole concrete bricks at 4'-0" on center.
- F. Required Recycled Content: Provide reinforcing materials from suppliers that utilize a minimum of 90% Post-Consumer Recycled Content (based on material cost) within the final manufactured product.
- G. Required Regional Material Content: Provide a minimum 90% of total reinforcing material content (based on material cost) from sources that have been extracted, harvested, or recovered as well as manufactured within 500 miles of the project site.

2.3 CONCRETE MATERIALS

- A. Portland Cement:
 - 1. Comply with ASTM C 150, Type I.
 - 2. Use one brand of cement throughout Project unless otherwise acceptable to Architect.
- B. Fly Ash: ASTM C 618, Type F.
- C. Normal-Weight Aggregates:
 - 1. Comply with ASTM C 33 and as specified. Provide aggregates from a single source for exposed concrete.
 - 2. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
 - 3. Local aggregates not complying with ASTM C 33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
 - 4. Do not use aggregates containing soluble salts, iron sulphide, pyrite, marcasite or ochre which can cause strains on exposed concrete surfaces.
 - 5. Dune sand, bank run sand and manufactured sand are not acceptable.
 - 6. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam or foreign matter, as follows:
 - a. Crushed stone, processed from natural rock or stone.
 - b. Washed gravel, either natural or crushed. Use of pit or bank run gravel is not permitted.
 - c. Maximum Aggregate Size: Not larger than one-fifth of the narrowest dimension between sides of forms, one-third of the depths of slabs nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars nor over 1" in max. size except for block fill where max. size shall not exceed ½".

These limitations may be waived if, in the judgement of the Architect, workability and methods of consolidation are such that concrete can be placed without honeycomb or voids.

- D. Water: Potable.
- E. Admixtures, General: Provide concrete admixtures that contain not more than 0.1 percent chloride ions.
- F. Air-Entraining Admixture:
 - 1. Comply with ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- G. Water-Reducing Admixture:
 - 1. Comply with ASTM C 494, Type A.

- H. High-Range Water-Reducing Admixture:
 - 1. Comply with ASTM C 494, Type F or Type G.
- I. Water-Reducing, Accelerating Admixture:
 - 1. Comply with ASTM C 494, Type E.
- J. Water-Reducing, Retarding Admixture: 1. Comply with ASTM C 494, Type D.
- K. Calcium Chloride: Calcium chloride will not be permitted in concrete.
- L. Required Regional Material Content: Provide a minimum 95% of total concrete material content (based on material cost) from sources that have been extracted, harvested, or recovered as well as manufactured within 500 miles of the project site.

2.4 RELATED MATERIALS

- A. Preformed Expansion Joint Fillers: Premolded fillers shall meet "Specifications for Premolded Expansion Joint Fillers for Concrete Paving and Structural Construction", ASTM D 1751-04.
- B. Reglets: Where sheet flashing or bituminous membranes are terminated in reglets, provide reglets of not less than 0.0217-inch-thick (26-gage) galvanized sheet steel. Fill reglet or cover face opening to prevent intrusion of concrete or debris.
- C. Slab on Grade Floor Joint Forms:
 - 1. Interior spaces: 24 ga., pre-shaped keyed type galvanized steel joint forms and stakes. Galvanizing shall be hot-dipped conforming to ASTM A 653-03 Grade E Steel G90 coating class.
 - 2. Exterior spaces: Wood or metal removable tongue and groove joint forms.
- D. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 pounds of fluosilicates per gallon.
- E. Sand Fill: Clean, manufactured or natural sand.
- F. Membrane-Forming Curing Compound: ASTM 1315, 30% solids content minimum, Type 1, Class A.
- G. Nonslip Aggregate Finish: Provide fused aluminum oxide granules or crushed emery as the abrasive aggregate for a nonslip finish, with emery aggregate containing not less than 50 percent aluminum oxide and not less than 25 percent ferric oxide. Use material that is factory-graded, packaged, rustproof, nonglazing, and unaffected by freezing, moisture, and cleaning materials.
- H. Colored Wear-Resistant Finish:
 - 1. Use packaged dry combination of materials consisting of portland cement, graded quartz aggregate, coloring pigments, and plasticizing admixture. Use coloring pigments that are finely ground nonfading mineral oxides interground with cement. Color as selected by Architect from manufacturers' standards, unless otherwise indicated.
- I. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.
- J. Moisture-Retaining Cover: One of the following, complying with ASTM C 171.
 - 1. Waterproof paper.
 - 2. Polyethylene film.
 - 3. Polyethylene-coated burlap.

- K. Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C 309, Type I, Class A.
- L. Epoxy Adhesive:
 - 1. ASTM C 881, two-component material suitable for use on dry or damp surfaces. Provide material type, grade, and class to suit Project requirements.

2.5 PROPORTIONING AND DESIGNING MIXES

- A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.
 - 1. Limit use of fly ash to not exceed 25 percent of cement content by weight.
- B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15 days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.
- C. Design mixes to provide normal weight concrete with the following properties as indicated on drawings and schedules:
 - 1. Formed Concrete: 4000-psi, 28-day compressive strength; 564 lbs. cement per cubic yard, minimum; Air-entrained.
 - 2. Foundations: 3000-psi, 28-day compressive strength; (non-air-entrained).
 - 3. Slabs on Grade: 3000-psi, 28-day compressive strength; (air-entrained).
 - 4. Concrete Masonry Fill: 2500-psi, 28-day compressive strength.
- D. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:
 - 1. Ramps, slabs, and sloping surfaces: Not more than 4 inches.
 - 2. Reinforced foundation systems: Not less than 1 inch and not more than 4 inches.
 - 3. Concrete containing high-range water-reducing admixture (superplasticizer): Not more than 8 inches after adding admixture to site-verified 2-to-3-inch slump concrete.
 - 4. Other concrete: Not more than 4 inches.
- E. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work. <u>No water shall be added to concrete mix at job site</u> <u>unless approved by Architect</u>.

2.6 ADMIXTURES

- A. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.
- B. Use accelerating admixture in concrete slabs placed at ambient temperatures below 50 deg F (10 deg C).
- C. Use high-range water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs, architectural concrete, parking structure slabs, concrete required to be watertight, and concrete with water-cement ratios below 0.50.
- D. Use air-entraining admixture in exterior exposed concrete unless otherwise indicated. Add airentraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having total air content with a tolerance of plus or minus 1-1/2 percent within the following limits:
 - 1. Concrete structures and slabs exposed to freezing and thawing, deicer chemicals, or hydraulic

pressure:

- a. 4.5 percent (moderate exposure); 5.5 percent (severe exposure) for 1-1/2-inch maximum aggregate.
- b. 4.5 percent (moderate exposure); 6.0 percent (severe exposure) for 1-inch maximum aggregate.
- c. 5.0 percent (moderate exposure); 6.0 percent (severe exposure) for 3/4-inch maximum aggregate.
- d. 5.5 percent (moderate exposure); 7.0 percent (severe exposure) for 1/2-inch maximum aggregate.
- 2. Other concrete not exposed to freezing, thawing, or hydraulic pressure, or to receive a surface hardener: 2 to 4 percent air.
- E. Use admixtures for water reduction and set accelerating or retarding in strict compliance with manufacturer's directions.

2.7 CONCRETE MIXING

- A. Job-Site Mixing:
 - 1. Mix concrete materials in appropriate drum-type batch machine mixer. For mixers of 1 cu. yd. or smaller capacity, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released. For mixers of capacity larger than 1 cu. yd., increase minimum 1-1/2 minutes of mixing time by 15 seconds for each additional cu. yd.
 - 2. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water introduced.
- B. Ready-Mixed Concrete:
 - 1. Comply with requirements of ASTM C 94, and as specified.
 - 2. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, vapor barrier, and other related materials with placement of forms and reinforcing steel.

3.2 FORMS

- A. General:
 - 1. Design, erect, support, brace, and maintain formwork to support vertical, lateral, static, and dynamic loads that might be applied until concrete structure can support such loads. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:
 - 2. Provide Class A tolerances for concrete surfaces exposed to view.
 - 3. Provide Class C tolerances for other concrete surfaces.
- B. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes.

Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

- C. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.
- D. Provide temporary openings for clean-outs and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- E. Chamfer exposed corners and edges as indicated, using wood, metal, PVC, or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.
- G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

3.3 PLACING REINFORCEMENT

- A. General:
 - 1. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports and as specified.
 - 2. Avoiding cutting or puncturing vapor barrier during reinforcement placement and concreting operations. Repair damages before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that reduce or destroy bond with concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcing by metal chairs, runners, bolsters, spacers, and hangers, as approved by Architect.
- D. Place reinforcement to maintain minimum coverages as indicated for concrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at all points of contact between slabs-on-grade and vertical surfaces column pedestals, foundation walls, grade beams and elsewhere as indicated on the drawings.

3.4 JOINTS

- A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect.
- B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

- C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.
- D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
- E. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.
- F. Construction Joints in Slabs-on-Grade:
 - 1. Construction joints for slab-on-grade (floor joints) shall be tongue and groove key type wood or steel joint form. Prefabricated metal floor joint forms shall be installed as per manufacturer's instructions.
 - 2. All floor joints to be removed shall be painted on one side with grease or mastic to prevent bond.
 - 3. Galvanized steel interior floor joint forms may be set to permit simultaneous pouring of concrete on both sides. Metal form to be left in place.
- G. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Joint fillers and sealants are specified in Division 7 Section "Joint Sealants."

3.5 INSTALLING EMBEDDED ITEMS

- A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.
- B. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, relieving angles, and other conditions.
- C. Install dovetail anchor slots in concrete structures as indicated on drawings.
- D. Edge Forms and Screed Strips for Slabs: Set edge forms, or bulkheads and intermediate screed strips for slabs to obtain the elevations and contours in the finished slab surface. Provide and secure units to support the type of screed strips by the use of strike-off templates or accepted compacting type screeds. Screed strips are to be constructed, supported and set to avoid displacement of reinforcing steel positions.

3.6 PREPARING FORM SURFACES

- A. General: Coat contact surfaces of forms with an approved, nonresidual, low-VOC, form-coating compound before placing reinforcement.
- B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.
 - 1. Coat steel forms with a nonstaining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.7 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

- B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.
- C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location.
- D. Placing Concrete in Forms:
 - 1. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.
 - 2. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embeddent of reinforcement and other embedded items without causing mix to segregate.
- E. Placing Concrete Slabs:
 - 1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.
 - 2. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
 - 3. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
 - 4. Maintain reinforcing in proper position on chairs during concrete placement.
- F. Cold-Weather Placement: Comply with provisions of ACI 306 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
- G. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
 - 1. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 2. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.
- H. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.
 - 1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
 - 3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.

4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with the holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.
- B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.
- C. Smooth-Rubbed Finish: Provide smooth-rubbed finish on scheduled concrete surfaces that have received smooth-formed finish treatment not later than 1 day after form removal.
 - 1. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
- D. Grout-Cleaned Finish:
 - 1. Provide grout-cleaned finish on scheduled concrete surfaces that have received smooth-formed finish treatment.
 - 2. Combine one part portland cement to one and one-half parts fine sand by volume, and a 50:50 mixture of acrylic or styrene butadiene-based bonding admixture and water to form the consistency of thick paint. Blend standard portland cement and white portland cement in amounts determined by trial patches so that final color of dry grout will match adjacent surfaces.
 - 3. Thoroughly wet concrete surfaces, apply grout to coat surfaces, and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 MONOLITHIC SLAB FINISHES

- A. Scratch Finish: Apply scratch finish to monolithic slab surfaces to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo, and other bonded applied cementitious finish flooring material, and where indicated.
 - 1. After placing slabs, finish surface to tolerances of F(F) 15 (floor flatness) and F(L) 13 (floor levelness) measured according to ASTM E 1155. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set with stiff brushes, brooms, or rakes.
- B. Float Finish:
 - 1. Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as specified; slab surfaces to be covered with membrane or elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo; and where indicated.
 - 2. After screeding, consolidating, and leveling concrete slabs, do not work surface until ready for floating. Begin floating, using float blades or float shoes only, when surface water has disappeared, or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both.

Consolidate surface with power-driven floats or by hand-floating if area is small or inaccessible to power units. Finish surfaces to tolerances of F(F) 20 (floor flatness) and F(L) 15 (floor levelness) measured according to ASTM E 1155. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

- C. Trowel Finish:
 - 1. Apply a trowel finish to monolithic slab surfaces exposed to view and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint, or another thin film-finish coating system.
 - 2. After floating, begin first trowel-finish operation using a power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and finish surfaces to tolerances of F(F) 25 (floor flatness) and F(L) 20 (floor levelness) measured according to ASTM E 1155. Grind smooth any surface defects that would telegraph through applied floor covering system.
- D. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply a trowel finish as specified, then immediately follow by slightly scarifying the surface with a fine broom.
- E. Nonslip Broom Finish:
 - 1. Apply a nonslip broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - 2. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- F. Nonslip Aggregate Finish:
 - 1. Apply nonslip aggregate finish to concrete stair treads, platforms, ramps, sloped walks, and where indicated.
 - 2. After completing float finishing and before starting trowel finish, uniformly spread 25 lb of dampened nonslip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as specified.
 - 3. After curing, lightly work surface with a steel wire brush or an abrasive stone, and water to expose nonslip aggregate.
- G. Chemical Hardener Finish:
 - 1. Apply chemical hardener finish to all exposed dry interior concrete floors exposed to view.
 - 2. Apply liquid chemical hardener after complete curing and drying of the concrete surface.
 - 3. Dilute the liquid hardener with water and apply three coats:
 - First Coat: 1/3 strength Second Coat: 1/2 strength Third Coat: 2/3 strength
 - 4. Evenly apply all coats and allow 24 hours drying time between coats.
 - 5. Apply proprietary chemical hardeners, in accordance with manufacturer's printed instruction.
 - 6. After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.
- H. F(L) and F(F) Exceptions:
 - 1. F(L) tolerances and testing specified herein shall not be applicable to formed elevated concrete slab surfaces.

2. F(L) and F(F) tolerances and testing specified shall not be applicable to surfaces within two feet of any floor joints, pre-positioned embedments, or any types of full-depth penetrations in accordance with ASTM E-1155.

3.10 MISCELLANEOUS CONCRETE ITEMS

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

3.11 CONCRETE CURING AND PROTECTION

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and troweling.
- B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days.
- C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified.
- D. Provide moisture curing by the following methods:
 - 1. Keep concrete surface continuously wet by covering with water.
 - 2. Use continuous water-fog spray.
 - 3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.
- E. Provide moisture-retaining cover curing as follows:
 - 1. Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
- F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:
 - 1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.
- G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.
 - 1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.12 CONCRETE SURFACE REPAIRS

- A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.
- B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.
 - 1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
 - 2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
- C. Repairing Formed Surfaces:
 - 1. Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.
 - 2. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.
- D. Repairing Unformed Surfaces:
 - 1. Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.
 - 2. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through nonreinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
 - 3. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
 - 4. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
 - 5. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
- E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

- A. General: The Contractor will employ a testing agency to perform tests and to submit test reports.
- B. Sampling and testing for quality control during concrete placement may include the following, as directed by Architect.
 - Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
 a. Slump: ASTM C 143; one test at point of discharge for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
 - Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
 - c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
 - d. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
 - e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. plus additional sets for each 50 cu. yd. more than the first 25 cu. yd. of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.
 - 2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. When total quantity of a given class of concrete is less than 50 cu. yd., Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
 - 4. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
 - 5. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi.
- C. Test results will be reported in writing to the Architect within 24 hours after tests. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing service, concrete type and class, location of concrete batch in structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day tests and 28-day tests.
- D. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.
- E. Additional Tests: The testing agency will make additional tests of in-place concrete when test results indicate specified concrete strengths and other characteristics have not been attained in the structure, as directed by Architect. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

END OF SECTION 033000

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SECTION 042200 - CONCRETE UNIT MASONRY

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. Concrete masonry units.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry joint reinforcement.
 - 5. Ties and anchors.
 - 6. Miscellaneous masonry accessories.

1.3 DEFINITIONS

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

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.
 - 5. Reinforcing bars.
 - 6. Joint reinforcement.

- 7. Anchors, ties, and metal accessories.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- 1.8 DELIVERY, STORAGE, AND HANDLING
 - A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
 - B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
 - C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
 - D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
 - E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- PART 2 PRODUCTS
- 2.1 MASONRY UNITS, GENERAL
 - A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
 - B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
- 2.2 CONCRETE MASONRY UNITS
 - A. Regional Materials: CMUs shall be manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
 - B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
 - C. CMUs: ASTM C 90.
 - 1. Density Classification: Lightweight except units required for 2-HR rated walls.
 - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 - 3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 - 4. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.3 CONCRETE AND MASONRY LINTELS

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

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2.4 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Masonry Cement: ASTM C 91.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Capital Materials Corporation; Flamingo Color Masonry Cement.
 - b. Cemex S.A.B. de C.V.; Brikset Type N.
 - c. Essroc, Italcementi Group; Brixment or Velvet.
 - d. Holcim (US) Inc.; Mortamix Masonry Cement.
 - e. Lafarge North America Inc.; Magnolia Masonry Cement.
 - f. Lehigh Cement Company; Lehigh Masonry Cement.
 - g. National Cement Company, Inc.; Coosa Masonry Cement.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. Grace Construction Products, W. R. Grace & Co. Conn.; Morset.
 - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA.
- I. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Interior Walls: Hot-dip galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
- B. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
 - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed or L-shaped steel bolts complying with ASTM A 307, Grade A (ASTM F 568M), Property Class 4.6; with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- B. Postinstalled Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.
 - 3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- C. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
 - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
 - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
 - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use masonry cement mortar unless otherwise indicated.
 - 3. For exterior masonry, use masonry cement mortar.
 - 4. For reinforced masonry, use masonry cement mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type N.
 - 3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 4. For interior non-load-bearing partitions, use Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
 - 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
 - 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.
- B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
- C. Joints:
 - 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
 - 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
 - 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
 - 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

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

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c. vertically.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

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

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows using one of the following methods:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
 - 2. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.
 - 3. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

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

3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.12 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Crush masonry waste to less than 4 inches in each dimension.

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- Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving." Do not dispose of masonry waste as fill within 18 inches of finished grade. 2.
- 3.
- Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property. C.

END OF SECTION 042200

SECTION 051200 - STRUCTURAL STEEL

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.
- B. Related Work:

Miscellaneous Metal Steel Joists

1.2 WORK INCLUDED

- A. The extent of structural steel work is shown on the drawings, including schedules, notes and details to show size and location of members, typical connections and type of steel.
- B. Approval by the Owner or his representative of shop drawings prepared by the fabricator indicates the fabricator has correctly interpreted the contract requirements. Approval does not relieve the fabricator of the responsibility for accuracy of detailed dimensions on shop drawings nor the general fit-up of parts to be assembled in the field.

1.3 SUMMARY

- A. This Section includes fabrication and erection of structural steel work, as shown on drawings including schedules, notes, and details showing size and location of members, typical connections, and types of steel required.
- B. Structural steel is that work defined in American Institute of Steel Construction (AISC) "Code of Standard Practice" and as otherwise shown on drawings.
- C. Miscellaneous Metal Fabrications are specified elsewhere in Division 5.
- D. Refer to Division 3 for anchor rod installation in concrete, Division 4 for anchor rod installation in masonry.

1.4 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).
 - 1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
 - 2. High-strength bolts (each type), including nuts and washers.
 - 3. Direct Tension Indicators if used.
 - 4. Unfinished bolts and nuts.
 - 5. Structural steel primer paint.
 - 6. Shrinkage-resistant grout.

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- C. Shop drawings prepared under supervision of a licensed Structural Engineer, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.
 - 1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
 - 2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
 - 3. Submit shop drawings including complete details and schedule for fabrication and shop assembly of members, and details, schedules, procedures and diagrams, showing the sequence of erection.
 - 4. Contractor shall check, approve and stamp all shop drawings prior to submittals to Architect.
 - 5. The shop drawings shall be reviewed by Architect <u>prior</u> to fabrication. Architect's review is for design only. Contractor is responsible for dimensions, quantities, and coordination with other trades. Engineer's review and acceptance of shop drawings is subject to all contract requirements and does not authorize any changes involving additional cost to Owner.
 - 6. Include details of cuts, connections, splices, camber and holes. Indicate welds by standard AWS symbols, and show size, length and type of each weld.
 - 7. Provide setting drawings, templates, and directions for the installation of anchor bolts and anchorages to be installed by others.
 - 8. Shop drawings shall be made to conform to the design drawings. Contract drawings shall take precedence over Shop Drawings.
- D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.
- E. Certified copies of each survey conducted by a licensed Land Surveyor, showing elevations and locations of base plates and anchor bolts to receive structural steel and final elevations and locations for major members. Indicate discrepancies between actual installation and contract documents.
- F. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.

1.5 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. Comply with provisions of following, except as otherwise indicated:
 - 2. American Institute of Steel Construction (AISC) "Code of Standard Practice for Steel Buildings and Bridges."
 - 3. AISC "Specifications for Structural Steel Buildings," including "Commentary."
 - 4. "Specifications for Structural Joints using ASTM A325 or A490 Bolts" approved by the Research Council on Structural Connections.
 - 5. American Welding Society (AWS) D1.1 "Structural Welding Code Steel."
 - 6. ASTM A6 "General Requirements for Delivery of Rolled Steel Plates, Shapes, Sheet Piling and Bars for Structural Use."
- B. Fabrication and Erection Qualifications:
 - 1. Fabricator and erector must have a minimum of five years experience with a proven record of satisfactory work.
 - 2. Fabricator and erector must have had work of similar type of construction to be considered as "satisfactory work".
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- 3. The Architect shall be the sole judge as to whether the fabricator and erector satisfactorily meets these requirements.
- 4. "Steel Fabricator" and "Steel Erector" shall be an organized steel company engaged in this type of work.
- 5. If any fabricator or steel erector is doubtful as to whether he meets these requirements, he may submit information to the Architect at least 10 days before the bid opening in order to qualify.
- C. Qualifications for Welding Work:
 - 1. Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.
 - 2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months.
 - 3. If recertification of welders is required, retesting will be Contractor's responsibility and shall be at no cost to the Owner.
- D. Source Quality Control:
 - 1. Materials and fabrication procedures are subject to inspection and tests in the mill, shop and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve the Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 2. Remove and replace materials or fabricated components which do not comply.
- E. Design of Members and Connections:
 - 1. All details are typical; similar details apply to similar conditions, unless otherwise indicated on the drawings. Verify dimensions at the site without causing delay in the work.
 - 2. Notify the Architect whenever design of members and connections for any portion of the structures is not indicated on the drawings or specified herein.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.
- B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and relubricate before use.
- D. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.
- B. Structural Steel Wide Flange Shapes: ASTM A992 Grade 50.
- C. Other Structural Steel Shapes, Plates, and Bars: ASTM A36.

- D. Cold-Formed Steel Tubing: ASTM A500, Grade B, Grade 46.
- E. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.
- F. Anchor Rods: ASTM F1554, nonheaded type unless otherwise indicated.
- G. Unfinished Threaded Fasteners:
 - 1. ASTM A 307, Grade A, regular low-carbon steel bolts and nuts.
 - 2. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.
- H. High-Strength Threaded Fasteners:
 - 1. Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:
 - 2. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A 325.
 - 3. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B 695, Class 50, or hot-dip galvanized complying with ASTM A 153.
- I. Direct Tension Indicators:
 - 1. ASTM F 959, type as required.
 - 2. Use on all A325 and A490 bolts.
- J. Electrodes for Welding: Comply with AWS Code.
- K. Structural Steel Primer Paint: SSPC Paint 11.
- L. Nonmetallic Shrinkage-Resistant Grout:
 - 1. Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621.
- M. Required Recycled Content: Provide structural steel wide flange shapes, tubes, plates, bars, and other structural steel shapes from suppliers that utilize a minimum of 45% Post-Consumer Recycled Content (based on material cost) within the final manufactured product.
- N. Required Regional Material Content: Provide 95% of structural steel wide flange shapes, tubes, plates, bars, and other structural steel shapes (based on material cost) from sources that have been extracted, harvested, or recovered as well as manufactured within 500 miles of the project site.

2.2 FABRICATION

- A. Shop Fabrication and Assembly:
 - 1. Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide parabolic camber in structural members where indicated.
 - 2. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
- B. Connections:
 - 1. Weld or bolt shop connections, as indicated.
 - 2. Provide high-strength threaded fasteners for all principal bolted connections, except unfinished bolts may be used for temporary bracing to facilitate erection. Bolts through 4" wide beam flanges shall be 5/8" diameter. Other bolts shall be 3/4" diameter.
 - 3. Unless indicated or detailed otherwise on plans, all connections shall be detailed and designed by

the fabricator under the direct supervision of a Professional Engineer, registered in the State of Georgia. Connections shall be designed as unrestrained flexible connections described as type 2 construction under Section A2 of the AISC Specifications for Structural Steel Buildings.

- 4. Except where otherwise detailed or specified on the contract drawings, all framed connections shall be detailed and designed by the fabricator in accordance with Part 4 of the AISC Manual of Steel Construction, 13th Edition dated 1989. Framed beam connections shall be capable of transmitting a minimum of fifty percent of total capacity of beam determined from the tables in Part 2 of AISC Manual of Steel Construction, 13th Edition for shape and span unless otherwise noted on the drawings.
- 5. Design calculations for the connections designed by the contractor shall be submitted for the files of the architect. Calculations shall bear the seal of a Professional Engineer registered in the State of Georgia. Shop drawings containing connections for which calculations have not been received will be returned unchecked as an incomplete submittals.
- 6. Connections shall be detailed and designed with provisions for eccentricities. Minimum connection capacity to be 10 kips unless otherwise noted on the drawings.
- C. Bolt field connections, except where welded connections or other connections are indicated.
 - 1. Provide high-strength threaded fasteners for all bolted connections.
 - 2. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.
- D. High-Strength Bolted Construction:
 - 1. Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A 325 or A 490 Bolts."
 - 2. All bolts shall have a hardened washer under the turning element.
 - 3. Installation of direct tension indicator washers or direct tension indicator bolt systems shall be in accordance with manufacturer's instructions.
- E. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.
- F. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.
- G. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints as indicated on drawings.
- H. Cooperation with Other Trades:
 - 1. Provide holes for securing other work to structural steel framing, and for the passage of other work through steel framing members, as shown on the final shop drawings. Provide threaded nut welded to framing, and other specialty items as shown to receive other work.
 - 2. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.
 - 3. All loose plates, bolts and inserts between the structural steel and work of other trades are to be furnished by the fabricator and set by other trades.
 - 4. All loose lintels to be furnished by the fabricator and set by other trades.

2.3 SHOP PAINTING

- A. General:
 - 1. Shop-paint structural steel, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed on exposed portions and initial 2 inches of embedded areas only.
 - 2. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
 - 3. Do not paint surfaces scheduled to receive sprayed-on fireproofing.

- 4. Apply 2 coats of paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
- B. Surface Preparation: After inspection and before shipping, clean steelwork to be painted. Remove loose rust, loose mill scale, and spatter, slag, or flux deposits. Clean steel in accordance with Steel Structures Painting Council (SSPC) as follows:
 - 1. SP-1 "Solvent Cleaning."
 - 2. SP-2 "Hand-Tool Cleaning."
 - 3. SP-3 "Power-Tool Cleaning."
 - 4. SP-6 "Commercial Blast Cleaning."
 - 5. SP-7 "Brush-Off Blast Cleaning."
- C. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide dry film thickness of not less than 2.0 mils. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- D. Painting: Provide a two-coat, shop-applied paint system complying with Steel Structures Painting Council (SSPC) Paint System Guide No. 7.00.

2.4 SOURCE QUALITY CONTROL

- A. General:
 - 1. Materials and fabrication procedures are subject to inspection and tests in mill, shop, and field, conducted by a qualified inspection agency. Such inspections and tests will not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
 - 2. Promptly remove and replace materials or fabricated components that do not comply.
- B. Design of Members and Connections:
 - 1. Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delay in the work.
 - 2. Promptly notify Architect whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 ERECTION

- A. General:
 - 1. Comply with AISC Specifications, AISC Code of Standard Practice, OSHA requirements, and as herein specified.
 - 2. All steel framing shall be considered <u>non-self-supporting steel frames</u> as defined by Article 7.9.3 of the AISC Code of Standard Practice dated September 1, 1986.
 - 3. Contractor shall provide all necessary temporary support until required connections or other interacting elements are complete.
- B. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.
- C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent

- D. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.
- E. Setting Base Plates and Bearing Plates:
 - 1. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of base and bearing plates.
 - 2. Set loose and attached base plates and bearing plates for structural members on wedges or other adjusting devices.
 - 3. Tighten anchor bolts after supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with edge of base or bearing plate prior to packing with grout.
 - 4. Pack grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure.
 - 5. For proprietary grout materials, comply with manufacturer's instructions.
- F. Field Assembly:
 - 1. Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 2. Level and plumb individual members of structure within specified AISC tolerances.
 - 3. Splice members only where indicated and accepted on shop drawings.
- G. Erection Bolts:
 - 1. On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.
 - 2. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
 - 3. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.
- H. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.
- I. Touch-Up Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.
 - 2. Apply by brush or spray to provide minimum dry film thickness of 2.0 mils.

3.2 QUALITY CONTROL

- A. Engage an independent testing and inspection agency to inspect high-strength bolted connections and welded connections and to perform tests and prepare test reports.
- B. Testing agency shall conduct and interpret tests, state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- C. Provide access for testing agency to places where structural steel work is being fabricated or produced so that required inspection and testing can be accomplished.
- D. Testing agency may inspect structural steel at plant before shipment.

- E. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.
- F. Shop-Bolted Connections:
 - 1. Inspect or test in accordance with AISC specifications.
 - 2. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F 959, Table 2.
- G. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of tension and moment resisting welds using one of the following procedures:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.
- H. Field-Bolted Connections:
 - 1. Inspect in accordance with AISC specifications.
 - 2. For Direct Tension Indicators, comply with requirements of ASTM F 959. Verify that gaps are less than gaps specified in Table 2.
- I. Field Welding: Inspect and test during erection of structural steel as follows:
 - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
 - 2. Perform visual inspection of all welds.
 - 3. Perform tests of tension and moment resisting welds using one of the following procedures:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
 - c. Radiographic Inspection: ASTM E 94 and ASTM E 142; minimum quality level "2-2T."
 - d. Ultrasonic Inspection: ASTM E 164.

END OF SECTION 051200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

- A. Section Includes:
 - Steel framing and supports for mechanical and electrical equipment. 1.
 - 2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 3. Elevator hoist beam.
 - Miscellaneous steel trim. 4.
 - 5. Loose bearing and leveling plates for applications where they are not specified in other Sections.
 - Steel shapes for supporting elevator door sills. 6.
 - 7. Metal ladders
 - 8. Bike rack
- Β. Products furnished, but not installed, under this Section:
 - 1. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.

C. **Related Sections:**

- 1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- Division 05 Section "Structural Steel Framing." Division 05 Section "Pipe and Tube Railings." 2.
- 3.

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces. 1.

1.4 ACTION SUBMITTALS

- Product Data: For the following: A.
 - 1. Paint products.
 - 2. Grout.
- Β. **LEED Submittals:**
 - Product data and certification letter indicating percentages by weight of 1. Credit MR 4: post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
 - Laboratory Test Reports for Credit IEQ 4: For primers, documentation indicating that products 2. comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.
- C. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.5 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

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

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- H. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- I. Source Limitations:
 - 1. Required recycled content: Provide ferrous metal shapes from suppliers that utilize a minimum of 45% Post-Consumer Recycled Content (based on material cost) within the final manufactured product.
 - 2. Required Regional Material Content: Provide 95% of ferrous metal shapes (based on material cost) from sources that have been extracted, harvested, or recovered as well as manufactured within 500 miles of the project site.

2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6 minimum 1/8 inch thick
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6 minimum 1/8 inch thick.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

2.4 FASTENERS

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

- 2. Provide stainless-steel fasteners for fastening stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- D. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 ; with hex nuts, ASTM F 594 ; and, where indicated, flat washers; Alloy Group 1 .
- E. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A 489.
- G. Machine Screws: ASME B18.6.3.
- H. Plain Washers: Round, ASME B18.22.1.
- I. Lock Washers: Helical, spring type, ASME B18.21.1.
- J. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- K. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- L. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- M. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.
- 2.6 FABRICATION, GENERAL
 - A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

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

2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - 1. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated recommended by partition manufacturer with attached bearing plates, anchors, and braces as indicated recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.8 METAL LADDERS

- A. General:
 - 1. Comply with ANSI A14.3 unless otherwise indicated.
 - 2. For elevator pit ladders, comply with ASME A17.1.
- B. Steel Ladders:
 - 1. Space siderails 18 inches apart unless otherwise indicated.
 - 2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
 - 3. Rungs: 1-inch- square steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.

METAL FABRICATIONS

- 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
- 6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
- 7. Prime ladders, including brackets and fasteners, with zinc-rich primer.

2.9 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize exterior miscellaneous steel trim.
- D. Prime exterior miscellaneous steel trim with primer specified in Division 09 Section "Exterior painting."

2.10 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize plates.

2.11 STEEL WELD PLATES AND ANGLES

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

2.12 BIKE RACK

A. Single-sided bike rack designed to accommodate 8 bikes. Provide 2" scheduled 40 pipe (2-3/8 inch diameter) continuous tubing bent to an 'S' shape. Bike rack to be a maximum of 89 inches long x 37 inches tall with a minimum of 10 inch pipe embedment into ground for securing rack. Provide black powder-coat finish on rack. Anchor ends of bike rack to ground via concrete per manufacturer's written instructions. Basis of design for bike 6rack is Belson Outdoors model #H36-9-P-IG Heavy Duty Challenger, 1-800-323-5664.

2.13 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Division 09 painting Sections zinc-rich primer is indicated.

- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." SSPC-SP 3, "Power Tool Cleaning." requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

PART 3 - EXECUTION

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

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.

3.3 INSTALLING BIKE RACKS

A. Set ends of bike rack in concrete foundation in size recommended by manufacturer. Install at location illustrated on drawings.

3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Steel pipe and tube railings.

B. Related Sections:

- 1. Section 061000 "Rough Carpentry" for wood blocking for anchoring railings.
- 2. Section 099123 "Interior Painting" for interior painting system finish for railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - 1. Steel: 72 percent of minimum yield strength.
- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F material surfaces.
- E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Railing brackets.
 - 2. Grout, anchoring cement, and paint products.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services'

"Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Verification: For each type of exposed finish required.
 - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - 2. Fittings and brackets.
 - 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of finishing connecting members at intersections.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.7 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

- 2.1 METALS, GENERAL
 - A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
 - B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
- 2.2 STEEL AND IRON
 - A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
 - C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
 - D. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Provide the following:
 - 1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.

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- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove flux immediately.
 - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Form changes in direction as follows:
 - 1. by inserting prefabricated elbow fittings of radius indicated required.
- J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.7 STEEL AND IRON FINISHES

- A. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." requirements indicated below:
 - 1. All Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance

Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Shop prime uncoated railings with primers specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting".

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
- B. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
- C. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

3.5 ATTACHING RAILINGS

- A. Attach railings to wall with wall brackets. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - 3. Basis of design for bracket is Julius Blum Co., Inc. Model #382.

- B. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
 - 4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting.".

3.7 **PROTECTION**

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 055213

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

1.

Section Includes: A.

- Framing with dimension lumber.
- Framing with engineered wood products.
- 2. 3. Wood blockingand nailers.
- Wood furring and grounds. Plywood backing panels. 4.
- 5.

Β. **Related Requirements:**

- Section 061600 "Sheathing." 1
- Section 313116 "Termite Control" for site application of borate treatment to wood framing. 2.

1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- Β. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - NeLMA: Northeastern Lumber Manufacturers' Association. NLGA: National Lumber Grades Authority.

 - 2. 3. **RIS:** Redwood Inspection Service.
 - 4.
 - SPIB: The Southern Pine Inspection Bureau. WCLIB: West Coast Lumber Inspection Bureau. 5.
 - WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- Product Data: For each type of process and factory-fabricated product. Indicate component materials and A. 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.
 - For products receiving a waterborne treatment, include statement that moisture content of treated 2. materials was reduced to levels specified before shipment to Project site. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 - 3.
- Β. **LEED Submittals:**
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 2. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
- C. Fastener Patterns: Full-size templates for fasteners in exposed framing.

1.5 INFORMATIONAL SUBMITTALS

- Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. A. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- Β. Evaluation Reports: For the following, from ICC-ES:
 - Wood-preservative-treated wood. 1.
 - 2. 3. Engineered wood products.
 - Power-driven fasteners.
 - 4. Powder-actuated fasteners.
 - 5. Expansion anchors.

6. Metal framing anchors.

1.6 QUALITY ASSURANCE

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

1.7 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. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 4. Provide dressed lumber, S4S, unless otherwise indicated.
 - B. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.
 - C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground,
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, 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.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
 - 1. Application: All interior partitions
 - 2. Species:

ROUGH CARPENTRY

- Mixed southern pine; SPIB. a.
- Β. Load-Bearing Partitions: Construction or No. 2 grade.
 - 1. Application: Interior load-bearing partitions.
 - 2. Species:
 - Southern pine; SPIB. a.
- C. Ceiling Joists: Construction or No. 2 grade.
 - 1. Species:
 - Southern pine; SPIB. a.
- D. Joists, Rafters, and Other Framing Not Listed Above: Construction or No. 2 grade.
 - 1. Species:
 - Southern pine; SPIB. a.

2.4 ENGINEERED WOOD PRODUCTS

- А. Engineered Wood Products, General: Products shall contain no urea formaldehyde.
- B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- C. 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:
 - Georgia-Pacific. a.
 - b.
 - Jager Building Systems Inc. Louisiana-Pacific Corporation. c.
 - d. Pacific Woodtech Corporation.
 - Standard Structures Inc. e.
 - f. Stark Truss Company, Inc.
 - Weyerhaeuser Company. g.
 - 2. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members.
 - 3 Modulus of Elasticity, Edgewise: 2,000,000 psi
- D. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Louisiana-Pacific Corporation. a.
 - b. Weyerhaeuser Company.
 - Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- depth members. 2.
 - Modulus of Elasticity, Edgewise: 2,200,000 psi.

2.5 MISCELLANEOUS LUMBER

- General: Provide miscellaneous lumber indicated and lumber for support or attachment of other А. construction, including the following:
 - Blocking. 1.
 - 2. Nailers.
 - 3. Furring. 4. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber and the following species:
 - 1. Mixed southern pine; SPIB.

- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
 - 1. Mixed 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.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.8 METAL FRAMING ANCHORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated on Drawings or comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- 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 0.036 inch thick.

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- 1. Use for wood-preservative-treated lumber and where indicated.
- Joist Hangers: U-shaped joist hangers with 2-inch- long seat and 1-1/4-inch- wide nailing flanges at least 85 percent of joist depth. E.
 - 1. Thickness: 0.050 inch.
- F. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - Strap Width: 1-1/2 inches. Thickness: 0.050 inch.
 - 1. 2.
- Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing. G.
- Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base H. and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- I. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: 1-1/4 inches.
 - 2. Thickness: 0.050 inch
 - 3. Length: As indicated.
- Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below. J.
- Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall K. studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and L. lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to M. other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
- Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep N. by 0.034 inch thick with hemmed edges.
- Wall Bracing: Angle bracing made for letting into studs in saw kerf, 15/16 by 15/16 by 0.040 inch thick О. with hemmed edges.

2.9 MISCELLANEOUS MATERIALS

- Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard A. widths to suit width of sill members indicated.
- 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 Β. an overall thickness of not less than 0.025 inch.
- C. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, 1. Subpart D (EPA Method 24).
- Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl D. butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

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

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- Β. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- Install sill sealer gasket to form continuous seal between sill plates and foundation walls. E.
- 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.
 - Provide metal clips for fastening gypsum board or lath at corners and intersections where framing 1. or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 48 inches o.c. 1. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line
 - 2. of top story, and at not more than 48 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
 - Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet 4. 0.C.
- I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPA 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.
- K. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1

 - NES NER-272 for power-driven fasteners. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code. 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.
- Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate L. 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.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - 1. Comply with approved indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
 - 2
 - 3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD GROUND, 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.
- Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless Β. otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

D. Provide permanent grounds of dressed, pressure-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 WOOD FURRING INSTALLATION

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

3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.
 - 1. For interior partitions and walls, provide 2-by-4-inch nominal-size wood studs spaced 16 inches o.c. unless otherwise indicated.
 - 2. Provide continuous horizontal blocking at midheight of partitions more than 48 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - 1. Reference header schedule on drawings.

3.5 FLOOR JOIST FRAMING INSTALLATION

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Fire Cuts: At joists built into masonry, bevel cut ends 3 inches and do not embed more than 4 inches.
- C. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- D. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.
- E. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- F. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- G. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- H. Provide solid blocking between joists under jamb studs for openings.
- I. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- J. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.

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- Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal- size lumber, double-crossed 1. and nailed at both ends to joists.
- 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

CEILING JOIST AND RAFTER FRAMING INSTALLATION 3.6

- Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above A. for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominalsize stringers spaced 48 inches o.c. crosswise over main ceiling joists.

3.7 STAIR FRAMING INSTALLATION

- Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply A. with the following requirements:
 - 1.
 - Size: 2-by-12-inch nominal- size, minimum. Material: Laminated-veneer lumber parallel-strand lumber or solid lumber. 2.
 - 3. Notching: Notch rough carriages to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
 - 4. Spacing: At least three framing members for each 36-inch clear width of stair.
- Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more Β. than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.8 PROTECTION

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

END OF SECTION 061000

SECTION 061600 - SHEATHING

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: Subflooring.
- B. Related Requirements: Section 061000 "Rough Carpentry" plywood backing panels.

1.3 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. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 2. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives and composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 3. Product Data for Credit IEQ 4.4: For composite wood products, documention indicating that product contains no urea formaldehyde.

1.4 QUALITY ASSURANCE

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

- 2.1 WOOD PANEL PRODUCTS
 - A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - B. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
 - C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
 - D. Factory mark panels to indicate compliance with applicable standard.

2.2 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Subflooring: Exposure 1, Structural I single-floor panels or sheathing.
 - 1. Span Rating: Not less than 16 o.c. or 32/16.
 - 2. Nominal Thickness: Not less than 7/8 inch.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened. D.

MISCELLANEOUS MATERIALS 2.4

- Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels. A.
 - 1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." 2.

PART 3 - EXECUTION

- INSTALLATION, GENERAL 3.1
 - Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three A. support members.
 - Β. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
 - C. Securely attach to substrate by fastening as indicated, complying with the following:
 - NES NER-272 for power-driven fasteners. 1.
 - 2.
 - NES NER-2/2 for power-driven fasteners. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code." 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.
 - Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without D. splitting wood.
 - E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
 - E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

- General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," A. for types of structural-use panels and applications indicated.
- Fastening Methods: Fasten panels as indicated below: Β.
 - 1. Subflooring:
 - Glue and nail to wood framing. a.
 - Space panels 1/8 inch apart at edges and ends. b.

END OF SECTION 061600

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SECTION 064116 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim.
 - 2. Wood cabinets.
 - 3. Plastic-laminate cabinets.
 - 4. Plastic-laminate countertops.
 - 5. Solid-surfacing-material countertops.
 - 6. Shop finishing of interior woodwork.
- B. Related Sections include the following:
 - 1. Division 061000 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Division 099123 Section "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For panel products high-pressure decorative laminate adhesive for bonding plastic laminate solid-surfacing material fire-retardant-treated materials cabinet hardware and accessories and finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. LEED Submittals:
 - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional. Project goal is that 90% of wood cabinet materials be regional materials and that fabrication of cabinet and countertops occur within 500 miles of project site.
 - 2. Product Data for Credit IEQ 4.1: For adhesives and glues used at Project site, documentation including printed statement of VOC content.
 - 3. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
 - 4. Laboratory Test Reports for Credit IEQ 4: For adhesives and composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 - 3. Show locations and sizes of cutouts and holes for plumbing fixtures faucets soap dispensers and other items installed in architectural woodwork.

D. Samples for Verification:

- 1. Lumber with or for transparent finish, not less than 5 inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
- 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
- 3. Veneer-faced panel products with or for transparent finish, 12 by 24 inches, for each species and cut. Include at least one face-veneer seam and finish as specified.
- 4. Lumber and panel products with shop-applied opaque finish, for lumber and 8 by 10 inches for panels, for each finish system and color, with 1/2 of exposed surface finished.
- 5. Plastic laminates, 8 by 10 inches, for each type, color, pattern, and surface finish, with 1 sample applied to core material and specified edge material applied to 1 edge.
- 6. Thermoset decorative-panels, 8 by 10 inches, for each type, color, pattern, and surface finish, with edge banding on 1 edge.
- 7. Solid-surfacing materials, 6 inches square.
- 8. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
 - b. Miter joints for standing trim.
- 9. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

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

1.6 QUALITY ASSURANCE

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- C. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature 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 woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- General: Provide materials that comply with requirements of AWI's quality standard for each type of A. woodwork and quality grade specified, unless otherwise indicated.
- Regional Materials: The following wood products shall be manufactured within 500 miles of Project site from B materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 milesof Project site.
 - 1 Interior trim.
 - 2. Interior plywood, hardboard, board paneling used to construct cabinets and countertops.
- C. Wood Species and Cut for Transparent Finish: Honduras Mahogany, plain sawn or sliced.
- D. Wood Species for Opaque Finish: Poplar or Southern Yellow Pine
- E. Wood Products: Comply with the following:
 - Low-Emitting Materials: Composite wood products shall comply with the testing and product 1. requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.'
 - 2. Hardboard: AHA A135.4.
 - 3. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehvde.
 - Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde. 4.
 - Softwood Plywood: DOC PS 1, Medium Density Overlay. 5.
 - Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no 6. urea formaldehyde.
- F. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or 1. semiexposed edges.
- G. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - Abet Laminati, Inc. a.
 - Arborite; Division of ITW Canada, Inc. b.
 - Formica Corporation. c.
 - d. Lamin-Art, Inc.
 - Nevamar Company, LLC; Decorative Products Div. e.
 - f. Panolam Industries International Incorporated.
 - Westinghouse Electric Corp.; Specialty Products Div.
 - g. h. Wilsonart International; Div. of Premark International, Inc.
 - 2. Colors and Patterns: As indicated by manufacturer's designations within Finish Legend.
- Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2. H.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.
 - ABA Industries. a.
 - Avonite. Inc. b.
 - E. I. du Pont de Nemours and Company. c.
 - Formica Corporation. d.
 - LG Chemical, Ltd. e.
 - Meganite Inc.; a division of the Pyrochem Group. f.
 - Nevamar Company, LLC; Decorative Products Div.
 - g. h. Samsung; Cheil Industries Inc.

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- i. Swan Corporation (The).
- j. Transolid, Inc.
- k. Wilsonart International; Div. of Premark International, Inc.
- 2. Type: Standard type, unless Special Purpose type is indicated.
- 3. Colors and Patterns: As indicated by manufacturer's designations within Finish Legend.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 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: Push-in magnetic catches, BHMA A156.9, B03131.
- F. Shelf Rests: BHMA A156.9, B04013; metal.
- G. Drawer Slides: BHMA A156.9, B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
 - 2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
 - 3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches high or 24 inches wide.
 - 4. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches high and 24 inches wide.
 - 5. Keyboard Slides: Grade 1; for computer keyboard shelves.
 - 6. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches high and 16 inches wide.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Grommets for Cable Passage through Countertops: 2-inch OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "SG series" by Doug Mockett & Company, Inc.
- K. Keyboard Drawer (under desk): Basis of design is model FEL9140303 manufactured by Fellows or an equal product by another manufacturer.
- L. 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.
- M. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- D. Adhesives, General: Adhesives shall not contain urea formaldehyde.

- E. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-cale Environmental Chambers."
- F. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Multipurpose Construction Adhesives: 70 g/L.
 - 3. Contact Adhesive: 250 g/L.
- G. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Premium Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch .
 - 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch .
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom
- B. Wood Species: Poplar or Southern Yellow Pine
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finish work.
- D. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.6 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Premium.

- B. AWI Type of Cabinet Construction: Flush overlay.
- C. Wood Species and Cut for Exposed Surfaces: Honduran Mahogany, "select Grade AA" plain sawn or sliced
 - 1. Grain Direction: Match grain direction of existing mahogany wall paneling.
 - 2. Matching of Veneer Leaves: Book match.
 - 3. Veneer Matching within Panel Face: Running match.
- D. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Thermoset decorative panels.
 - 2. Drawer Sides and Backs: Solid-hardwood lumber, stained to match species indicated for exposed surfaces.
 - 3. Drawer Bottoms: Hardwood plywood.
- 2.7 PLASTIC-LAMINATE CABINETS
 - A. Grade: Custom.
 - B. AWI Type of Cabinet Construction: Flush overlay.
 - C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
 - 2. Vertical Surfaces: Grade HGS VGS.
 - 3. Edges: Grade VGS
 - D. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS .
 - a. Edges of Plastic-Laminate Shelves: PVC tape, 0.018-inch minimum thickness, matching laminate in color, pattern, and finish.
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
 - 2. Drawer Sides and Backs: Thermoset decorative panels.
 - 3. Drawer Bottoms: Thermoset decorative panels.
 - E. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
 - F. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by laminate manufacturer's designations within Finish Legend.

2.8 SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Grade: Premium.
- B. Solid-Surfacing-Material Thickness: 3/4 inch.
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
 - 1. As indicated by manufacturer's designations within Finish Legend.
- D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate tops with shop-applied edges of materials and configuration indicated.
 - 2. Fabricate tops with shop-applied backsplashes loose backsplashes for field application.

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- E. Install integral sink bowls in countertops in shop.
 - 1. Basis of Design for sink bowl is model #810 by Corian; Dupont.
 - 2. Color: As selected by Architect from manufacturer's full range.
- F. Drill holes in countertops for plumbing fittings, grommets, and soap dispensers in shop.
- G. Grommets: Contract amount is to allow for a total of 50 grommets installed after counters are complete at locations directed by Owner. Basis of Design for grommet is model TG in black plastic by Doug Mockett and Company Inc.

2.9 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.
- D. Finishing Materials: Products shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.
- F. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- G. Transparent Finish:
 - 1. Grade: Premium
 - 2. AWI Finish System: Catalyzed polyurethane.
 - 3. Staining: Match approved sample color for wood door.
 - 4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 - 5. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.
- H. Opaque Finish:
 - 1. Painted finish as required in Section 099123 "Interior Painting"

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.

- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork 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. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches
- H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Maintain veneer sequence matching of cabinets with transparent finish.
 - 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 - 2. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 3. Secure backsplashes to walls with adhesive.
 - 4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- J. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- K. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 064116
SECTION 071616 - CRYSTALLINE WATERPROOFING

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 crystalline waterproofing for positive-side application to concrete.
- B. Related Sections:
 - 1. Section 033000 "Cast-in-Place Concrete" for waterstops, and finishing concrete walls and slabs to receive waterproofing.
 - 2. Section 079200 "Joint Sealants" for elastomeric and preformed sealants in concrete and concrete unit masonry walls and floors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions and installation instructions for crystalline waterproofing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Applicator.
- B. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for crystalline waterproofing.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.

1.6 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.
- B. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
- C. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at 40 deg F or above during work and cure period, and space is well ventilated and kept free of water.

PART 2 - PRODUCTS

2.1 WATERPROOFING MATERIALS

- A. Crystalline Waterproofing: Prepackaged, gray-colored proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; that has VOC content complying with limits of authorities having jurisdiction; with properties meeting or exceeding the criteria specified below.
 - 1. Products: Subject to compliance with requirements, provide one of the following:

- American PERMAOUIK Inc.; Super 200. а
- Anti-Hydro International, Inc.; A-H Hydrocap. b.
- AQUAFIN, Inc.; AQUAFIN-1C. c.
- d. BASF Building Systems; Tegraproof.
- Conproco Corporation; Conpro Super Seal. e.
- Euclid Tamms: HEY'DI K-11 f.
- Gemite Products Inc.; Cem-Kote CW Plus. g.
- ICS Penetron International Ltd.; Penetron. h.
- International Chem-Crete, Inc.; Chem-Cretex Cem 600. i.
- j. k. IPA Systems, Inc.; Drycon.
- Kryton Group of Companies (The); Krystol T1 & T2 Waterproofing System.
- Vandex USA LLC; Vandex Super/Super White. Xypex Chemical Corporation; Xypex. 1.
- m.
- Water Permeability: Maximum zero for water at 30 feet when tested according to CE CRD-C 48. 2. 3.
 - Compressive Strength: Minimum 4000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.2 ACCESSORY MATERIALS

- Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended A. by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
- B. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
- C. Portland Cement: ASTM C 150, Type I.
- Sand: ASTM C 144. D.
- Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve E. adhesion to prepared substrates and not to create a vapor barrier.
- F. Water: Potable.

2.3 MIXES

- A. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.
- Β. Protective Topping: Measure, batch, and mix portland cement and sand in the proportion of 1:3 and water gaged with a polymer admixture. Blend together with mechanical mixer to required consistency.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
- Proceed with application only after unsatisfactory conditions have been corrected. Β.
- C. Notify Architect in writing of active leaks or defects that would affect system performance.

3.2 PREPARATION

A. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.

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- B. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
- C. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.
- D. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
 - 1. At holes and cracks in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and approximately 1 inch deep. Fill reveal with patching compound flush with surface.
- E. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 - 1. Clean concrete surfaces according to ASTM D 4258.
 - a. Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
 - b. Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
 - 2. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

3.3 APPLICATION

- A. General: Comply with waterproofing manufacturer's written instructions for application and curing.
 - 1. Saturate surface with water for several hours prior to application and maintain damp condition until applying waterproofing. Remove standing water.
 - 2. Apply waterproofing to surfaces indicated on Drawings.
 - 3. Number of Coats: Number required for specified water permeability.
 - 4. Application Method: Brush. Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
 - 5. Dampen surface between coats.
- B. Final Coat Finish: Brushed.
- C. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.
- D. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:
 - 1. Onto entire elevator concrete pit surface (walls, floor, sump pump pit). Extend treatment up to finish floor concrete floor surface (approximately 42" from pit floor).
- E. Protective Topping: Apply 1-inch- thick, protective topping over floor surfaces.

3.4 FIELD QUALITY CONTROL

A. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 071616

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SECTION 072100 - THERMAL INSULATION

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. Glass-fiber blanket insulation.
 - 2. Spray polyurethane foam insulation.
- B. Related Sections:
 - 1. Section 072413 "Polymer-Based Exterior Insulation and Finish System (EIFS)" for insulation specified as part of these systems.
 - 2. Section 078446 "Fire-Resistive Joint Systems" for insulation installed as part of a perimeter fire-resistive joint system.
 - 3. Section 092900 "Gypsum Board" for installation in wood-framed assemblies of insulation specified by referencing this Section.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 1.6 DELIVERY, STORAGE, AND HANDLING
 - A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

- 2.1 GLASS-FIBER BLANKET INSULATION
 - A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corporation.
 - 2. Guardian Building Products, Inc.
 - 3. Johns Manville.

- 4. Knauf Insulation.
- 5. Owens Corning.
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- C. Kraft-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (non-reflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier). Provide in R-Value thickness indicated on drawings.+
- D. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.2 SPRAY POLYURETHANE FOAM INSULATION

- A. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BaySystems NorthAmerica, LLC.
 - b. Demilec (USA) LLC.
 - c. Gaco Western Inc.
 - d. Icynene Inc.
 - e. SWD Urethane Company.
 - 2. Minimum density of 0.4 lb/cu. ft., thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F
 - 3. Thermal value: R-Value per inch based on ASTM C 518 be a minimum of 3.81.
- B. Ignition Barrier: Cover all exposed surfaces of open-cell polyurethane foam insulation with a spray-applied ignition barrier which is compliant with 2006 IBC Chapter 2603.4 and 2603.5.7 and ASTM E 119, and NFPA 286.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. BLAZELOKTM IB4 at 3 mils dry film thickness, 5 mils wet film thickness.
 - b. Andek Firegard at 10 mils dry film thickness, 16 mils wet film thickness.
 - c. No Burn Plus XD at 4 mils dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- 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. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.2 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber or Mineral-Wool 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.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For wood-framed construction, install blankets according to ASTM C 1320 and as follows:
 - a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
 - b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions and to thickness indicated on drawings. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied follow manufacturer's written guidelines for timeframe to install Ignition barrier. Install ignition barrier over entire exposed face of sprayfoam insulation to required thickness to comply with test requirements.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION 072100

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SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section Includes: Manufactured Products: A.
 - Manufactured through-wall flashing and counterflashing. a.

Β. **Related Sections:**

- 1.
- Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking. Division 07 Section "Roof Accessories" for roof hatches, vents, and other manufactured roof accessory 2. units.

1.3 PERFORMANCE REQUIREMENTS

- General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural A. movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations **B**. in FMG Loss Prevention Data Sheet 1-49:
 - Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. : 90-lbf/sq. ft. perimeter uplift force, 1. 120-lbf/sq. ft. corner uplift force, and 45-lbf/sq. ft. outward force.
- Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient C. and surface temperature changes.
 - Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces. 1.

1.4 ACTION SUBMITTALS

- Product Data: For each type of product indicated. Include construction details, material descriptions, Α. dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, Β. elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - Identification of material, thickness, weight, and finish for each item and location in Project. 1.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, 3. cleats, clips, and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.
 - 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 - 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 7. Details of special conditions.
 - Details of connections to adjoining work. 8
 - Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches. 9.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required 1. profile. Include fasteners, cleats, clips, closures, and other attachments.

- 2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
- 3. Accessories and Miscellaneous Materials: Full-size Sample.

D. LEED Submittals

- 1. Product Data for Credit MR5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- 2. Product data for credit IEQ 4.1 for adhesives and glues used including statement of VOC content

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified fabricator.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
 - 2. Review methods and procedures related to sheet metal flashing and trim.
 - 3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
 - 5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 ; structural quality.
 - 2. Surface: Smooth, flat and with manufacturer's standard clear acrylic coating on both sides.
 - 3. Exposed Coil-Coated Finish:

- a. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 4. Color: As selected by Architect from manufacturer's full range.
- 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil
- C. Zinc Sheet: Zinc, 99 percent pure, alloyed with a maximum of 1 percent copper and titanium; with manufacturer's standard factory-applied, flexible, protective back coating.

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F.
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Metal-Fab Manufacturing, LLC; MetShield.
 - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 - 2. Fasteners for Aluminum-Zinc Alloy-Coated Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
 - 3. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
 - 1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
 - 2. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

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- E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- H. Do not use graphite pencils to mark metal surfaces.

2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.
- B. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.

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- 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws for metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
 - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - 1. Do not solder metallic-coated steel sheet.

- 2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
- G. Rivets: Rivet joints in zinc where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant interlocking folded seam or blind rivets and sealant anchor and washer at 36-inch centers.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.6 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.8 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof hatches.
- B. Related Sections:
 - 1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
 - 2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.
- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.6 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation.
 - 1. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 1 mil for topcoat. Comply with coating

manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

- 2. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used, otherwise mill finished.
- C. Stainless-Steel Sheet and Shapes: ASTM A 240/A 240M or ASTM A 666, Type 304.
- D. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized according to ASTM A 123/A 123M unless otherwise indicated.
- E. Steel Tube: ASTM A 500, round tube.
- F. Galvanized-Steel Tube: ASTM A 500, round tube, hot-dip galvanized according to ASTM A 123/A 123M.
- G. Steel Pipe: ASTM A 53/A 53M, galvanized.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Glass-Fiber Board Insulation: ASTM C 726, thickness as indicated.
- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Underlayment:
 - 1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 - 1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.
- H. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
 - a. Babcock-Davis.

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- b. Bilco Company (The).
- c. Custom Solution Roof and Metal Products.
- d. Dur-Red Products.
- e. J. L. Industries, Inc.
- f. Metallic Products Corp.
- g. Milcor Inc.; Commercial Products Group of Hart & Cooley, Inc.
- h. Nystrom.
- B. Type and Size: Single-leaf lid, 24 by 36 inches.
- C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- D. Hatch Material: Zinc-coated (galvanized) steel sheet, 0.079 inch thick.
 - 1. Finish: Baked enamel or powder coat.
 - 2. Color: As selected by Architect from manufacturer's full range.
- E. Construction:
 - 1. Insulation: Glass-fiberboard.
 - 2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 - 3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 - 4. Fabricate curbs to minimum height of 12 inches unless otherwise indicated.
 - 5. Sloping Roofs: Equip hatch with water diverter or cricket on side that obstructs water flow.
- F. Hardware: Galvanized-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
- G. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.
 - 1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
 - 2. Height: 42 inches above finished roof deck.
 - 3. Material: Steel tube.
 - 4. Post: 1-5/8-inch diameter pipe.
 - 5. Finish: Manufacturer's standard baked enamel or powder coat.
 - a. Color: As selected by Architect from manufacturer's full range.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. 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, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance. Flash roof hatch curb to existing roof using compatible roof materials to create watertight seal.
- C. Roof-Hatch Installation:
 - 1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 - 2. Attach ladder-assist post according to manufacturer's written instructions.
- D. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
- B. Clean exposed surfaces according to manufacturer's written instructions.
- C. Clean off excess sealants.
- D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.
 - 2. Penetrations in horizontal assemblies.
 - 3. Penetrations in smoke barriers.
- B. Related Sections:
 - 1. Division 07 Section "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittal:
 - 1. Product Data for Credit IEQ 4.1: For penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For penetration firestopping sealants and sealant primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
 - 1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, **[provide products by one of the following]** :
 - 1. A/D Fire Protection Systems Inc.
 - 2. Grace Construction Products.
 - 3. Hilti, Inc.
 - 4. Johns Manville.
 - 5. Nelson Firestop Products.
 - 6. NUCO Inc.
 - 7. Passive Fire Protection Partners.
 - 8. RectorSeal Corporation.
 - 9. Specified Technologies Inc.
 - 10. 3^M Fire Protection Products.
 - 11. Tremco, Inc.; Tremco Fire Protection Systems Group.
 - 12. USG Corporation.

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Fire-resistance-rated walls include [fire walls] [fire-barrier walls] [smoke-barrier walls] [and] [fire partitions].
 - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Horizontal assemblies include floors and roof assemblies.
 - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
 - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
- D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
 - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.

- E. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
- F. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- G. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- H. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- I. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Slag-wool-fiber or rock-wool-fiber insulation.
 - b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3

2.4 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.5 MIXING

A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning Penetration Firestopping Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Final Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

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SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Joints in or between fire-resistance-rated constructions.
 - 2. Joints in smoke barriers.

B. Related Sections:

1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For fire-resistive joint system sealants, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For fire-resistive joint system sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.
 - 1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.5 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:
 - 1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:
 - a. Fire-resistive joint system products bear classification marking of qualified testing agency.
 b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:
 - 1) UL in its "Fire Resistance Directory."

PROJECT CONDITIONS 1.6

- А. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of В. ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to A. specified requirements.
- Β. Coordinate sizing of joints to accommodate fire-resistive joint systems.
- C. Notify Owner's testing agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

FIRE-RESISTIVE JOINT SYSTEMS 2.1

- Where required, provide fire-resistive joint systems that are produced and installed to resist spread of fire A. according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:
 - 1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
 - 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.
 - 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - A/D Fire Protection Systems Inc. a.
 - CEMCO. b.
 - c. Fire Trak Corp.
 - d. Grace Construction Products.
 - Hilti, Inc. e.
 - f. Johns Manville.
 - Nelson Firestop Products.
 - g. h. NUCO Inc.
 - Passive Fire Protection Partners. i.
 - RectorSeal Corporation. j.
 - k. Specified Technologies Inc.
 - 1. 3M Fire Protection Products.
 - Tremco, Inc.; Tremco Fire Protection Systems Group. m.
 - USG Corporation. n.
- C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.
 - 1. L-Rating: Not exceeding 5.0 cfm/ft of joint at 0.30 inch wg at both ambient and elevated temperatures.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - A/D Fire Protection Systems Inc. a.
 - b. Grace Construction Products.
 - Hilti, Inc. c.
 - d. Johns Manville.
 - Nelson Firestop Products. e.
 - NUCO Inc. f

- Passive Fire Protection Partners.
- g. h. RectorSeal Corporation.
- Specified Technologies Inc. i.
- 3M Fire Protection Products. j.
- Tremco, Inc.: Tremco Fire Protection Systems Group. k.
- USG Corporation. 1.
- D. Exposed Fire-Resistive Joint Systems: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Fire-resistive joint system sealants shallcomply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - Architectural Sealants: 250 g/L. 1.
 - Sealant Primers for Nonporous Substrates: 250 g/L. 2.
 - Sealant Primers for Porous Substrates: 775 g/L. 3.
- Low-Emitting Materials: Fire-resistive joint system sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." F.
- Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, G. that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine substrates and conditions, with Installer present, for compliance with requirements for joint A. configurations, substrates, and other conditions affecting performance of the Work.
- Β. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using Β. that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 **INSTALLATION**

- General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions A. and published drawings for products and applications indicated.
- Install forming materials and other accessories of types required to support fill materials during their Β. application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - After installing fill materials and allowing them to fully cure, remove combustible forming materials 1. and other accessories not indicated as permanent components of fire-resistive joint system.

- C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning Fire-Resistive Joint System Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.
- C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

- A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Final Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

RELATED DOCUMENTS 1.1

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

1.2 SUMMARY

- Section Includes: A.
 - 1. Silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Latex joint sealants.
- Β. **Related Sections:**
 - Division 04 Section "Concrete Unit Masonry" for masonry control and expansion joint fillers and 1. gaskets.
 - 2. Division 07 Section "Fire-Resistive Joint Systems" for sealing joints in fire-resistance-rated construction.
 - 3.
 - 4
 - Division 08 Section "Glazing" for glazing sealants. Division 09 Section "Gypsum Board" for sealing perimeter joints. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with 5. acoustical sealant.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- Β. **LEED Submittals:**
 - Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing 1.
 - system, documentation including printed statement of VOC content. Laboratory Test Reports for Credit IEQ 4: For sealants and sealant primers used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." 2.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance D. of exposed surfaces adjacent to joint sealants.
- Joint-Sealant Schedule: Include the following information: E.
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - Joint-sealant color. 4.

INFORMATIONAL SUBMITTALS 1.4

- Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the А. following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

1.5 QUALITY ASSURANCE

- Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation A. of units required for this Project.
- Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer. Β.

- C. Product Testing: Test joint sealants using a qualified testing agency.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by
 - 2. reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

PROJECT CONDITIONS 1.6

- A. Do not proceed with installation of joint sealants under the following conditions:
 - When ambient and substrate temperature conditions are outside limits permitted by joint-sealant 1. manufacturer or are below 40 deg F.
 - 2 When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - Where contaminants capable of interfering with adhesion have not yet been removed from joint 4 substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- 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 А. manufacturer, based on testing and field experience.
- VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall Β. comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1.
 - Architectural Sealants: 250 g/L. Sealant Primers for Nonporous Substrates: 250 g/L. Sealant Primers for Porous Substrates: 775 g/L. 2. 3.
- Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Emissions and Practice Components of Complexity C. Environmental Chambers.
- Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates. D.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint E. substrates indicated for Project.
- F. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range. G.

2.2 SILICONE JOINT SEALANTS

- Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant (JS-3): ASTM C 920, Type S, Grade NS, Class 50, for Use NT. A.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - BASF Building Systems; Omniseal 50. a.
 - b.
 - Dow Corning Corporation; 795. GE Advanced Materials Silicones; SilPruf NB SCS9000. May National Associates, Inc.; Bondaflex Sil 295. Pecora Corporation; 895 NST. Polymeric Systems, Inc.; PSI-641. c.
 - d.
 - e. f

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- Sika Corporation, Construction Products Division; SikaSil-C995. Tremco Incorporated; Spectrem 2. g. h
- Β. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant (JS-5): ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - Products: Subject to compliance with requirements, provide one of the following:
 - BASF Building Systems; Omniplus. a.
 - b.
 - Dow Corning Corporation; 786 Mildew Resistant. GE Advanced Materials Silicones; Sanitary SCS1700. May National Associates, Inc.; Bondaflex Sil 100 WF. Tremco Incorporated; Tremsil 200 Sanitary. c.
 - d.
 - e.

2.3 **URETHANE JOINT SEALANTS**

1.

- Single-Component, Nonsag, Urethane Joint Sealant (JS-2): ASTM C 920, Type S, Grade NS, Class 25, for Α. Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - BASF Building Systems; Sonolastic NP1. а
 - Bostik, Inc.; Chem-Calk 915. b.
 - c. d.

 - e. f.

 - May National Associates, Inc.; Bondaflex PUR 25. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II. Pecora Corporation; Dynatrol I-XL. Polymeric Systems, Inc.; Flexiprene 1000. Sika Corporation, Construction Products Division; Sikaflex 1a. g. h
 - Tremco Incorporated; Vulkem 116.
- Singlecomponent, Nonsag, Traffic-grade Urethane Joint Sealant (JS-1): ASTM C 920, Type S, Grade NS, Β. Class 25. for Use T.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - BASF Building Systems; Sonolastic NP 1. a
 - b.
 - May National Associates, Inc.; Bondaflex PUR 40 FS. Pacific Polymers International, Inc.; Elasto-Thane 230 Type II. c.
 - d. Pecora Corporation; Dynatred.
 - Sika Corporation, Construction Products Division; Sikaflex 1a Tremco Incorporated; Vulkem 116. e.
 - f

2.4 LATEX JOINT SEALANTS

- Α. Latex Joint Sealant (JS-6): 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:
 - BASF Building Systems; Sonolac. Bostik, Inc.; Chem-Calk 600. Pecora Corporation; AC-20+. Schnee-Morehead, Inc.; SM 8200. a.
 - b.
 - c.
 - d.
 - Tremco Incorporated; Tremflex 834. e.

2.5 JOINT SEALANT BACKING

- Α. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- Β. 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.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

MISCELLANEOUS MATERIALS 2.6

Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint Α. substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

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- Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and Β. adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

EXAMINATION 3.1

- Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for A. joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- Proceed with installation only after unsatisfactory conditions have been corrected. Β.

3.2 PREPARATION

- Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with A. joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint 2. sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - Concrete. a.
 - Masonry. b.
 - Unglazed surfaces of ceramic tile. c. d.
 - Exterior insulation and finish systems.
 - Remove laitance and form-release agents from concrete. 3.
 - Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - Glass. b.
 - Porcelain enamel. c.
 - d. Glazed surfaces of ceramic tile.
- Β. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal. C.

3.3 INSTALLATION OF JOINT SEALANTS

- General: Comply with joint-sealant manufacturer's written installation instructions for products and A. applications indicated, unless more stringent requirements apply.
- Β. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - Do not leave gaps between ends of sealant backings. 1.
 - Do not stretch, twist, puncture, or tear sealant backings.
 - 2. 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

JOINT SEALANTS

- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of ioints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. 2. 3. Place sealants so they directly contact and fully wet joint substrates.

 - Completely fill recesses in each joint configuration. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of ioint.
 - Remove excess sealant from surfaces adjacent to joints.
 - 1. 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 FIELD OUALITY CONTROL

- Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows: A.
 - 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint a. substrate.
 - Perform 1 test for each 1000 feet of joint length thereafter or 1 test per each floor per elevation. h
 - 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. 2.
 - For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut a. along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a.
 - Whether sealants filled joint cavities and are free of voids. Whether sealant dimensions and configurations comply with specified requirements. b.
 - Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint c. substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results 4. and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 - Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts 5. original sealant.
- Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or Β. noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with A. cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

PROTECTION 3.6

Protect joint sealants during and after curing period from contact with contaminating substances and from A. damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Final Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

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3.7 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces JS-1.
 - 1. Joint Locations:
 - Isolation and contraction joints in cast-in-place concrete slabs. a.
 - b. Other joints as indicated.
 - 2. 3. Joint Sealant: Single-component, nonsag, traffic rated urethane
 - Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2. Β.
 - 1 Joint Locations:
 - Joints between exterior different materials except window frame assemblies. a.
 - Perimeter joints between exterior materials on frames of doors windows and louvers. b.
 - Other joints as indicated. c.
 - 2. 3. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 50.
 - Joint-Sealant Color: as selected from manufacturer's full range of colors.
- C. Joint-Sealant Application: Exterior vertical joints in non-traffic surfaces JS-3
 - 1. Joint Locations:
 - Perimeter exterior joints of windows and doors. a.
 - b. Other joints as indicated.
 - 2. 3. Joint Sealant: Single component, nonsag, silicone joint sealant
 - Joint-Sealant Color: selected from manufacturer's full range of colors
- D. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.
 - 1. Joint Locations:
 - Control and expansion joints on exposed interior surfaces of exterior walls. a.
 - b.
 - Perimeter joints of exterior openings where indicated. Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.
 - c. d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
 - Other joints as indicated. e.
 - 2. 3.
 - Joint Sealant: Latex Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic E. surfaces JS-5.
 - Joint Sealant Location: 1
 - Joints between plumbing fixtures and adjoining walls, floors, and counters. a.
 - Tile control and expansion joints and joints between dissimilar materials within toilet spaces b. where indicated.
 - Other joints as indicated. c.
 - 2. 3.
 - Joint Sealant: Single component, nonsag, mildew resistant, acid curing. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors

END OF SECTION 079200

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section Includes: A.
 - 1. Exterior stile and rail wood doors and sidelites.
 - Interior stile and rail wood doors.
 - 2. 3. Interior fire-rated, stile and rail wood doors.
 - 4. Fitting stile and rail wood doors to frames and machining for hardware.
 - 5. Prehanging doors in frames.
- Related Requirements: Section 099123 "Interior Painting" for field finishing stile and rail doors. Β.

1.3 ACTION SUBMITTALS

- Product Data: For each type of product. A.
 - Include details of construction and glazing. 1.
 - Include factory-finishing specifications. 2.
- **LEED Submittals:** Β.
 - Product Certificates for Credit MR 5: All stile and rail doors and frames are required to be extracted and 1. manufactured within 500 miles of project site. Include statement indicating cost for each regionally manufactured material.
 - Include statement indicating location of manufacturer and distance to Project for each regionally a. manufactured material.
 - Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate b. distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
 - 2. Product Data for Credit IEQ 4.4: For adhesives and composite wood materials, documentation indicating that products contain no urea formaldehyde.
 - 3. Laboratory Test Reports for Credit IEQ 4.1: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each C. kind of door; construction details not covered in Product Data, including those for stiles, rails, panels, and moldings (sticking); and other pertinent data, including the following:
 - 1.
 - Dimensions of doors for factory fitting. Locations and dimensions of mortises and holes for hardware. 2. 3.
 - Undercuts.
 - 4. Requirements for veneer matching.
 - 5. Doors to be factory finished and finish requirements.
 - Fire-protection ratings for fire-rated doors. 6.
- Samples for Verification: Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish D. Sample with same materials proposed for factory-finished doors.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of door, from manufacturer.
- Β. Sample Warranty: For special warranty.
- 1.5 DELIVERY, STORAGE, AND HANDLING
 - Comply with requirements of referenced standard and manufacturer's written instructions. A.

- Package doors individually in opaque plastic bags or cardboard cartons. B.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

- Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period. A.
- Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work B in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.7 WARRANTY

- Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, within specified warranty period. Α.
 - Warranty shall also include installation and finishing that may be required due to repair or replacement 1. of defective doors.
 - 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Interior Doors: Five years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

Source Limitations: Obtain stile and rail wood doors from single manufacturer. Α

2.2 MATERIALS

- General: Use only materials that comply with referenced standards and other requirements specified. A.
 - Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints. Assemble interior doors, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints. 1.
 - 2.
- Regional Materials: Stile and rail wood doors shall be manufactured within 500 miles of Project site from **B**. materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." D
- E. Panel Products: Any of the following unless otherwise indicated:
 - 1. Particleboard made from wood particles, with binder containing no urea-formaldehyde, complying with ANSI A208.1, Grade M-2.
 - 2. Particleboard made from straw, complying with ANSI A208.1, Grade M-2, except for density.
 - <u>3</u>. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde, complying with ANSI A208.2, Grade 130.
 - 4. Hardboard complying with ANSI A135.4.
 - 5. Veneer-core plywood, made with adhesive containing no urea-formaldehyde.
- Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, F. unless those of Category I are expressly indicated and permitted.

2.3 INTERIOR STILE AND RAIL WOOD DOORS

- Interior Stile and Rail Wood Doors (081433.A): Interior stock doors complying with the AWI's, AWMAC's, and WI's "Architectural Woodwork Standards," and with other requirements specified. А.
 - Manufacturers: Subject to compliance with requirements, available manufacturers offering products 1. that may be incorporated into the Work include, but are not limited to, the following:
 - Algoma Hardwoods, Inc. a.
- Artistic Doors and Windows, Inc. Belentry Doors LLC. b.
- c.
- d. Dimension Millworks.
- Eggers Industries. e. f.
- Enjo Architectural Millwork.
- g. h. Harring Doors.
- Maiman Company (The). Marshfield DoorSystems, Inc. i.
- Pinecrest Inc.
- j. k. Select Door.
- Sun-Dor-Co. 1.
- Woodtech Trading Company. m.
- Panel Designs: Match panel layout and profile of existing doors remaining. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are 2. proposed, submit comprehensive explanatory data to Architect for review.
- Grade: Custom. Finish: Opaque. 3.
- 4.
- 5 Door Construction for Opaque Finish:
 - Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed. a. Raised-Panel Construction: b. Clear softwood lumber; edge glued for width or shaped, medium-density fiberboard.
- Stile and Rail Widths: Match widths found on existing doors remaining. 6.
- Raised-Panel Thickness: Manufacturer's standard, but not less than 3/4 inch. 7.
- 8. 9.
- Molding Profile (Sticking): Match existing stile and rail door profile. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick complying with Section 088000 "Glazing."

2.4 INTERIOR FIRE-RATED, STILE AND RAIL WOOD DOORS

- 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 Α. ŬL 10Ć.
 - Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes 1. of standard fire-test exposure.
 - 2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
- Interior Fire-Rated Stile and Rail Wood Doors (45 & 60 minute label): Β.
 - Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following: 1.
 - a.
 - Algoma Hardwoods, Inc. Artistic Doors and Windows, Inc. b.
 - Dimension Millworks. c. d.
 - Eggers Industries.
 - Enjo Architectural Millwork. e.
 - f.
 - g. h.
 - Harring Doors. Maiman Company (The). Marshfield DoorSystems, Inc.
 - Pinecrest Inc. i.
 - Select Door. j. k.
 - Sun-Dor-Co.
 - VT Industries Inc. 1.
 - Woodtech Trading Company. m.
 - Panel Designs: Match panel layout and profile of existing doors remaining. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review. 2.
 - Grade: Custom. 3.
 - Finish: Opaque. 4.
 - 5. Door Construction for Opaque Finish: 1-3/4-inch- thick stiles and rails and veneeredraised panels not less than 1-1/8 inches thick.
 - Stile and Rail Construction: Veneered, structural composite lumber or veneered edge- and a. end-glued lumber.
 - Raised-Panel Construction: Shaped, medium-density fiberboard. b.

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- 6. Stile and Rail Widths: Manufacturer's standard, but not less than the following:
 - a. Stiles, Top and Intermediate Rails: 4-1/2 inches .
 - b. Bottom Rails: 9 inches.
- 7. Molding Profile (Sticking): As selected by Architect from manufacturer's full range.

2.5 STILE AND RAIL WOOD DOOR FABRICATION

- A. Fabricate stile and rail wood doors in sizes indicated for field fitting.
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- C. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- D. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.
- E. Glazed Openings: Factory install glazing in doors, complying with Section 088000 "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
- F. Prehung Doors: Provide stile and rail doors complete with frames, and door hinge hardware.
 - 1. Provide wood door frames that are made of same wood species as stile and rail doors. Door frames to have double rabbetted frame. Provide fire-rated door frames that are matching that provided to achieve approved tested assemblies.
 - 2. Provide hardware that complies with Section 087100 "Door Hardware."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "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. Factory-Fitted Doors and Frames: Align in frames for uniform clearance at each edge.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081433

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware, power supplies, back-ups and surge protection.
 - 3. Cylinders specified for doors in other sections.
- C. Related Sections: Section 08 14 33 Stile and Rail Wood Doors.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC International Building Code.
 - 3. NFPA 70 National Electrical Code.
 - 4. NFPA 80 Fire Doors and Windows.
 - 5. NFPA 101 Life Safety Code.
 - 6. NFPA 105 Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.
- E. Standards: All hardware specified herein shall comply with the following industry standards:
 - 1. ANSI/BHMA Certified Product Standards A156 Series
 - 2. UL10C Positive Pressure Fire Tests of Door Assemblies

1.3 SUBMITTALS

- A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.
- B. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
 - 2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.
 - 3. Content: Include the following information:
 - a. Type, style, function, size, label, hand, and finish of each door hardware item.
 - b. Manufacturer of each item.
 - c. Fastenings and other pertinent information.

- d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
- e. Explanation of abbreviations, symbols, and codes contained in schedule.
- f. Mounting locations for door hardware.
- g. Door and frame sizes and materials.
- 4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
- C. Shop Drawings: Details of electrified access control hardware indicating the following:
 - 1. Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:
 - 2. Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
 - 3. Complete (risers, point-to-point) access control system block wiring diagrams.
 - 4. Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.
- D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.
- E. Informational Submittals:
 - 1. LEED Submittals: Manufacturer's product information and applicable sustainability program credits that are available to contribute towards a LEED rated project certification.
 - a. Credit MR 4.1 and 4.2: Manufacturer's or fabricator's certificate indicating percentage of post-consumer recycled content by weight and pre-consumer recycled content by weight for each Product specified under this Section. Use materials with recycled content such that the sum of the post-consumer recycled content plus one-half of the pre-consumer content constitutes an additional 10% beyond MR Credit 4.1 (total of 20% based on cost) of the total values of the material in the project as follows:
 - 1) Floor Closers: 63%
 - 2) Pivots: 78%
 - 3) Cylindrical Locks: 58%
 - 4) Mortise Locks: 57%
 - 5) Exit Devices: 54%
 - 6) Door Closers: 51%
 - 7) Overhead Stops: 46%
 - b. Low-Emitting Materials EQ 4.2: Provide products that reduce the quantity of indoor air contaminants that are odorous, irritating, and/or harmful to the comfort and well-being of installers and occupants; products shall not produce VOC emissions.
- F. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

G. Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

1.4 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
 - 1. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- D. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.
- E. Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.
 - 1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 - 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- F. Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:
 - 1. NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 2. Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:
 - a. Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - b. Door Closers: Comply with the following maximum opening-force requirements indicated:
 - 1) Interior Hinged Doors: 5 lbf ()applied perpendicular to door.

DOOR HARDWARE

- 2) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- c. Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

- 3. NFPA 101: Comply with the following for means of egress doors:
 - a. Latches, Locks, and Exit Devices: Not more than 15 lbf ()to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.
 - b. Thresholds: Not more than 1/2 inch () high.
- 4. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 (neutral pressure at 40" above sill) or UL-10C.
 - a. Test Pressure: Positive pressure labeling.
- G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.
- H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
 - 1. Function of building, purpose of each area and degree of security required.
 - 2. Plans for existing and future key system expansion.
 - 3. Requirements for key control storage and software.
 - 4. Installation of permanent keys, cylinder cores and software.
 - 5. Address and requirements for delivery of keys.
- I. Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.
 - 1. Prior to installation of door hardware, arrange for manufacturers' representatives to hold a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.
 - 2. Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.
 - 3. Review sequence of operation narratives for each unique access controlled opening.
 - 4. Review and finalize construction schedule and verify availability of materials.
 - 5. Review the required inspecting, testing, commissioning, and demonstration procedures
- J. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

COORDINATION 1.6

- Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work Α. specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- Β. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.7 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace B. components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
 - Structural failures including excessive deflection, cracking, or breakage. 1.
 - Faulty operation of the hardware. 2.
 - Deterioration of metals, metal finishes, and other materials beyond normal weathering. 3.
 - Electrical component defects and failures within the systems operation. 4.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
 - Ten years for extra heavy duty cylindrical (bored) locks and latches. 1.
 - Seven years for heavy duty cylindrical (bored) locks and latches.
 - 2. 3. Twenty five years for manual door closer bodies.
 - Two years for electromechanical door hardware. 4.

MAINTENANCE SERVICE 1.8

- Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance A. instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- Continuing Service: Beginning at Substantial Completion, and running concurrent with the B. specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 HANGING DEVICES

Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in A. the Door Hardware Sets.

- 1. Quantity: Provide the following hinge quantity, unless otherwise indicated:
 - Two Hinges: For doors with heights up to 60 inches. a.
 - Three Hinges: For doors with heights 61 to 90 inches. b.
 - Four Hinges: For doors with heights 91 to 120 inches. C.
 - For doors with heights more than 120 inches (,)provide 4 hinges, plus 1 hinge for d. every 30 inches () of door height greater than 120 inches.
- 2. Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - Widths up to 3'0": 4-1/2" standard or heavy weight as specified. a.
 - b. Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.
- 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - Exterior Doors: Heavy weight, non-ferrous, ball bearing hinges unless Hardware Sets a. indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing hinges unless Hardware Sets indicate heavy weight.
 - Tornado Resistant Assemblies: At a minimum, provide heavy weight hinges with c. stainless steel screws used in accordance with and specified as part of a Severe Storm Shelter Opening meeting ICC 500 and FEMA 361.
- 4. Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:
 - 1) Out-swinging exterior doors.
 - Out-swinging access controlled doors. 2)
 - 3Ś Out-swinging lockable doors.
- 5. Acceptable Manufacturers:
 - Hager Companies (HA). a.
 - McKinney Products (MK). b.
- c. Stanley Hardware (ST). Pin and Barrel Continuous Hinges: ANSI/BHMA A156.26 certified pin and barrel 6. continuous hinges with minimum 12 gauge (.105) Type 304 stainless steel hinge leaves, concealed teflon-coated stainless pin, and twin self-lubricated nylon bearings at each knuckle separation. Fabricate hinges non-handed and U.L. listed for use on up to and including 3 hour rated doors and U.L. listed for windstorm components where applicable. Provide hinges with power transfer cutouts where indicated at electrified openings.
 - Acceptable Manufacturers: а
 - Markar Products (MR). 1)
 - McKinney Products (MK). 2)
 - 3) Pemko Manufacturing (PE).

POWER TRANSFER DEVICES 2.2

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with MolexTM standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to throughdoor wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
 - Acceptable Manufacturers: 1.

- a. Hager Companies (HA) ETW-QC (12 wires) Option.
- b. McKinney Products (MK) QC (12 wires) Option.
- B. Provide mortar guard enclosure on steel frames installed at masonry openings for each electrical hinge specified.
- C. Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.
 - 1. Acceptable Manufacturer: McKinney Products (MK) QC-C Series.

2.3 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
- C. Cylinders: Original manufacturer cylinders complying with the following:
 - 1. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 - 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 - 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 - 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
- D. Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.
 - 1. Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.
 - a. DG1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.
 - b. Acceptable Manufacturer: Sargent Manufacturing (SA) Degree Series.
- E. Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:
 - 1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
- F. Key Quantity: Provide the following minimum number of keys:
 - 1. Top Master Key: One (1)
 - 2. Change Keys per Cylinder: Two (2)
 - 3. Master Keys (per Master Key Group): Two (2)
 - 4. Grand Master Keys (per Grand Master Key Group): Two (2)

- 5. Construction Keys: Twelve (12)
- G. Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".
- H. Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2.4 MECHANICAL LOCKS AND LATCHING DEVICES

- A. Cylindrical Locksets, Grade 1 (Extra-Heavy Duty): ANSI 156.2 Series 4000, Grade 1 certified cylindrical (bored) locksets able to withstand 3000 inch pounds of torque applied to the locked lever without gaining access. Locksets to fit a standard 2 1/8" bore without the use of through-bolts. Lever handles to be made of solid material with no plastic fillers and latchbolt head to be one-piece stainless steel construction encased within the lock body. Furnish with standard 2 3/4" backset, 1/2" throw latchbolt (3/4" at rated paired openings), and universal non-handed.
 - 1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) CL3100 Series.
 - b. Sargent Manufacturing (SA) 11 Line.
- B. Lock Trim Design: As specified in Hardware Sets.
- C. Knurling: Where required by local code provide knurling or abrasive coating to all levers on doors leading to hazardous areas such as mechanical rooms, boiler and furnace rooms, janitor closets, and as otherwise required or specified.

2.5 INTEGRATED WIEGAND OUTPUT ACCESS CONTROL LOCKING DEVICES

- A. Integrated Wiegand Output Cylindrical Locks: Wiegand output ANSI A156.2, Grade 1, Cylindrical Lockset with integrated proximity card reader and request-to-exit signaling in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle trim with 1/2" deadlocking stainless steel latch. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings.
 - 1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside lever handle (request-to-exit) signaling standard with door position (open/closed status) monitoring (via separately connected DPS).
 - 2. Reader supports 13.56 MHz (2K-32K) iClass® credentials.
 - 3. 12VDC external power supply required for reader and lock, with optional 24VDC operation available with iClass® reader. Fail safe or fail secure options.
 - a. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
 - b. Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
 - 1) Acceptable Manufacturer: Sargent Manufacturing (SA) Harmony H2 10 Line.

2.6 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:
 - 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: Provide manufacturer's special strike box fabricated for aluminum framing.
- B. Standards: Comply with the following:
- C. Strikes for Mortise Locks and Latches: BHMA A156.13.
- D. Strikes for Bored Locks and Latches: BHMA A156.2.
- E. Strikes for Auxiliary Deadlocks: BHMA A156.5.
- F. Dustproof Strikes: BHMA A156.16.

2.7 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
 - 1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.
 - 2. Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 - 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.
 - 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 - a. Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.
 - b. Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.
 - c. Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.
 - d. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.
 - 5. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units and high impact, non-corrosive plastic covers standard.
 - 1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) DC8000 Series.
 - b. Sargent Manufacturing (SA) 351 Series.
 - c. Norton Door Controls (NO) 7500 Series.
 - d. Yale Locks and Hardware (YA) 4400 Series.

2.8 ARCHITECTURAL TRIM

- A. Door Protective Trim
 - 1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
 - 2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
 - be as specified in the Hardware Sets.
 3. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following.
 - a. Stainless Steel: 050-inch ()thick, with countersunk screw holes (CSK).
 - b. Brass or Bronze: 050-inch ()thick, with countersunk screw holes (CSK).
 - c. Laminate Plastic or Acrylic: 1/8-inch thick, with countersunk screw holes (CSK).
 - 4. Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.
 - 5. Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.
 - 6. Acceptable Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).

2.9 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 - 1. Acceptable Manufacturers:
 - a. Burns Manufacturing (BU).
 - b. Rockwood Manufacturing (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 - 1. Acceptable Manufacturers:
 - a. Rixson Door Controls (RF).
 - b. Rockwood Manufacturing (RO).

2.10 ARCHITECTURAL SEALS

A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.

DOOR HARDWARE

- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 - 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: :Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.
 - 1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Acceptable Manufacturers:
 - 1. Pemko Manufacturing (PE).
 - 2. Reese Enterprises, Inc. (RS).

2.11 ELECTRONIC ACCESSORIES

- A. Stand Alone Proximity Card Readers: Stand alone card readers are 13.56 MHz (2K-32K) iClass® compatible, 12VDC/24VDC hardwired, constructed of weather resistant electronics suitable for either indoor or outdoor applications. 2000 Users and 2000 audit events. Auxiliary 2 amp relay to signal alarm shunt, propped or forced door (separate door status switch required).
 - 1. Acceptable Manufacturer: Sargent Manufacturing (SA) 6120 Series.
- B. Wiegand Test Unit: Test unit verifies proper Wiegand output integrated card reader lock installation in the field by testing for proper wiring, card reader data integrity, and lock functionality including lock/unlock, door position, and request-to-exit status. 12 or 24VDC voltage adjustable operating as Fail Safe or Fail Secure.
 - 1. Acceptable Manufacturers:
 - a. Corbin Russwin Hardware (RU) WT1 Wiegand Test Unit.
 - b. Sargent Manufacturing (SA) WT1 Wiegand Test Unit.
- C. Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.
 - 1. Acceptable Manufacturers:
 - a. Sargent Manufacturing (SA) 3500 Series.
 - b. Securitron Door Controls (SU) BPS 12/24 Series.

2.12 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
 - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 - 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program.
- D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into existing painted door and frame surfaces, Contractor to perform work in such a way that door is not damaged and required to be re-painted unless already scheduled to receive new painted finish. Do not install surface-mounted items until new finishes have been completed on substrates involved.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

3.5 ADJUSTING

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

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation. Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SCHEDULE

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.
- B. Manufacturer's Abbreviations:
 - 1. RO Rockwood
 - 2. MK McKinney
 - 3. SA Sargent
 - 4. SU Securitron
 - 5. RF Rixson
 - 6. PE Pemko
 - 7. HS HES

HARDWARE SCHEDULE

| Se | t: 1.0: Doors: 104A, 104B, 130A | | Description: Classroom | Function |
|----|---------------------------------|------------------------------|-------------------------------|-----------|
| 3 | Hinge | TA2714 NRP 4-1/2" x 4-1/2" | US3 | MK |
| 1 | Classroom Lock | DG1 21 11G37 LL | US3 | SA |
| 1 | Wall Stop | 406 | US3 | RO |
| 3 | Silencer | 609 | | RO |
| Se | t: 2.0L Doors: 108A | Description: Existing E | xterior Electronic Acces | s Control |
| 1 | Classroom Lock | DG1 21 11G37 LL | US3 | SA |
| 1 | Magnetic Lock | M62B | | SU |
| 1 | Threshold | 171AK MS10SS | | PE |
| 1 | Sweep | 315CN | | PE |
| 1 | Wall Smart Card Reader | 6120 | | SA |
| 1 | Push Button | PB4 | | SU |
| 1 | Exit Button | EEB2 | | SU |
| 1 | Motion Sensor | XMS | | SU |
| 1 | Indicator Buzzer | 2006M | | HS |
| 1 | Power Supply | BPS-24 x Amperage as require | ed | SU |
| 2 | Jamb Gasketing | 290AS | | PE |
| 1 | Head Gasketing | 2891AS | | PE |

Notes: Existing hinges and closer to remain. Verify hardware compatibility with existing conditions. Intercom system by others. OPERATION: Remote pushbutton, inside motion sensor, inside emergency button or outside card reader temporarily release magnetic lock: automatic relock. Mechanical lock can be locked or unlocked outside by key. Inside lever allows egress. Local buzzer indicates unlocked condition.

| Set: 3.0L Doors: 100A | Descr | iption: Existing Exte | rior Lobby |
|--|---|--|---------------------------|
| 1 Classroom Lock | DG1 21 11G37 LL | US3 | SA |
| 1 Door Closer | TB 351 CPS | EN | SA |
| 1 Threshold | 171AK MS10SS | | PE |
| 1 Sweep | 315CN | | PE |
| 2 Jamb Gasketing | 290AS | | PE |
| 1 Head Gasketing | 2891AS | | PE |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 4.0: Doors: 104C, 120A | Description: E | xisting with new clas | sroom lock |
| 1 Classroom Lock | DG1 21 11G37 LL | US3 | SA |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 5.0: Doors: 114A, 218A | Descript | tion: Existing with ne | w cylinder |
| 1 Cylinder | DG1 21 34 | US3 | SA |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex
Set: 6.0: Doors: 107A, 200A, 201A, | to remain.
xisting conditions.
202A, 203A, 225A | | |
| 1 Decessor Cat | Description: Existing | <u>y with passage functions</u> | on latchset |
| I Passage Set | IIUI3 LL | 035 | SA |
| Notes: Balance of existing hardware to
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 7.0: Doors: 117A, 118A, 122A, 222A, 223A, 224A, 226A, 228A | , 200B, 201B, 202B, 203B, 204A,
Description: F | 212A, 213A, 214A, 2
Existing with office fu | 19A, 220A,
nction lock |
| 1 Office Lock | DG1 21 11G05 LL | US3 | SA |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 8.0: Doors: 109A, 231A | Description: Exi | sting with privacy fu | nction lock |
| 1 Privacy Set | 11U65 LL | US3 | SA |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 9.0: Doors: 123A, 217A, 229A | Description: Existin | ng with storeroom fu | nction lock |
| 1 Storeroom Lock | DG1 21 11G04 LL | US3 | SA |
| Notes: Balance of existing hardware t
Verify hardware compatibility with ex | o remain.
xisting conditions. | | |
| Set: 10.0: Doors: 110A, 126A, 211A | A Description: E | Existing mechanical r | oom access |
| 1 Storeroom Lock | DG1 21 76 11G04 LL | US3 | SA |
| Network Delement of an interview let 1 | | | |

Notes: Balance of existing hardware to remain. Verify hardware compatibility with existing conditions.

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| Set: 11.0: Doors: 001A | | Description: Existing Basement Storeroom | | | |
|------------------------|----------------|---|--|-------|----|
| 1 | Storeroom Lock | DG1 21 11G04 LL | | US26D | SA |
| 1 | Door Closer | 351 O | | EN | SA |
| 1 | Filler Plate | LF161 | | | RO |
| 1 | Filler Plate | FC161 | | | RO |
| 1 | Filler Plate | SFB160 | | | RO |

Notes: Balance of existing hardware to remain. Verify hardware compatibility with existing conditions.

Set: 12.0: Doors: 105A, 128A

| Set: 12.0: Doors: 105A, 128A | | | Description : | Description: Card Access | |
|------------------------------|-----------------------------|-------------------------------|----------------------|---------------------------------|--|
| 1 | Hinge (heavy weight) | T4A3786 QC12 4-1/2" x 4-1/2" | US3 | MK | |
| 2 | Hinge (heavy weight) | T4A3786 NRP 4-1/2" x 4-1/2" | US3 | MK | |
| 1 | Integrated Card Reader Lock | 21 H2-10G271 LL GMK | US3 | SA | |
| 1 | Door Closer | TB 351 O | US3 | SA | |
| 1 | Wall Stop | 406 | US3 | RO | |
| 3 | Silencer | 608 | | RO | |
| 1 | ElectroLynx Harness | QC-C1500P | | MK | |
| 1 | ElectroLynx Harness | QC-C400 | | MK | |
| 1 | Power Supply | BPS-24 x Amperage as required | | SU | |

Notes: Access control panel and security management software by security integrator. Prep door and hinge jamb for electronic device. Furnish wiring harness in door per specifications. OPERATION: Outside integral reader temporarily unlocks outside lever: auto-relock. Electronic function is fail-secure with outside key override. Inside lever always allows egress and includes REX. Lock includes door position switch and latchbolt monitor switch.

| Se | t: 13.0: Doors: 127A, 234A | I | Description: Rated Stair - | Passage |
|----|-----------------------------------|------------------------------------|---------------------------------------|----------|
| 3 | Hinge (heavy weight) | T4A3786 NRP 4-1/2" x 4-1/2" | US3 N | МK |
| 1 | Passage Set | 11U15 LL | US3 S | SA |
| 1 | Door Closer | TB 351 O | US3 S | SA |
| 1 | Kickplate | K1050 6" high | US3 F | RO |
| 1 | Wall Stop | 406 | US3 F | RO |
| 1 | Gasketing | S88D | F | PΕ |
| Se | t: 14.0: Doors: 101A, 102A, 103A, | 103B, 106A, 124A, 209A, 232 | A Description | : Office |
| 3 | Hinge | TA2714 NRP 4-1/2" x 4-1/2" | US3 N | МK |
| 1 | Office Lock | DG1 21 11G05 LL | US3 S | SA |
| 1 | Wall Stop | 406 | US3 F | RO |
| 3 | Silencer | 609 | F | RO |
| Se | t: 15.0: Doors: 129A. 206A | | Description: Toilet - | Privacv |
| 3 | Hinge | TA2714 NRP 4-1/2" x 4-1/2" | US3 N | MK |
| 1 | Privacy Set | 11U65 LL | US3 S | SA |
| 1 | Kickplate | K1050 6" high | US3 F | 80 |
| 1 | Wall Stop | 406 | US3 F | RO RO |
| 3 | Silencer | 609 | E E E E E E E E E E E E E E E E E E E | RÕ |
| 50 | t. 160 Doorg. 1314 2074 2104 | | Decemintion, Sta | nonoom |
| 30 | L: 10.0 D0018: 151A, 207A, 210A | T = 4.0714 NDD $4.1/211 = 4.1/211$ | Description: Sto | |
| 5 | Hinge | 1A2/14 NRP 4-1/2 X 4-1/2 | | VIK |
| 1 | Storeroom Lock | DGI 21 11G04 LL | | A A |
| I | Wall Stop | 406 | US3 F | KU |
| 3 | Silencer | 609 | ł | RO |
| Se | t: 17.0 Doors: 115A, 115B, 119A | | Description: Rated File | Storage |
| 3 | Hinge | TA2714 NRP 4-1/2" x 4-1/2" | US3 N | MK |
| 1 | Storeroom Lock | DG1 21 11G04 LL | US3 S | SA |
| 1 | Door Closer | TB 351 O | US3 S | SA |
| 1 | Kickplate | K1050 6" high | US3 F | RO |
| 1 | Wall Stop | 406 | US3 F | RO |
| 1 | Gasketing | S88D | F | ΡE |

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| Set: 18.0 Doors: 112A | | Descri | Description: Rated Mechanical Room | | | |
|-----------------------|--------------------|----------------------------|------------------------------------|------------|--|--|
| 3 | Hinge | TA2714 NRP 4-1/2" x 4-1/2" | US3 | MK | | |
| 1 | Storeroom Lock | DG1 21 76 11G04 LL | US3 | SA | | |
| 1 | Door Closer | TB 351 O | US3 | SA | | |
| 1 | Kickplate | K1050 6" high | US3 | RO | | |
| 1 | Wall Stop | 406 | US3 | RO | | |
| 1 | Gasketing | S88D | | PE | | |
| Set: 19.0 Doors: 127B | | | Description: Existing | g Exterior | | |
| 3 | Hinge Filler Plate | DFF4 | | RO | | |
| 1 | Continuous Hinge | MCK-FM300 | US3 | MK | | |
| 1 | Storeroom Lock | DG1 21 11G04 LL | US3 | SA | | |
| 1 | Door Closer | 351 CPS | US3 | SA | | |
| 1 | Kickplate | K1050 6" high | US3 | RO | | |
| 1 | Threshold | 171AK MS10SS | | PE | | |
| 1 | Sweep | 315CN | | PE | | |
| 2 | Jamb Gasketing | 290AS | | PE | | |
| 1 | Head Gasketing | 2891AS | | PE | | |

Notes: Verify hardware compatibility with existing conditions.

END OF SECTION 08710

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS**

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

1.2 SUMMARY

- Section includes glazing for the following products and applications, including those specified in other A. Sections where glazing requirements are specified by reference to this Section:
 - 1. Interior glazing
- B. Related Sections: Division 08 Section "Mirrors."

1.3 DEFINITIONS

- Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced A. glazing publications.
- Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036. Β.
- C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

- General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads A. (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces. 1.

1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- Β. LEED Submittals:
 - 1.
 - Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content. Laboratory Test Reports for Credit IEQ 4: For glazing sealants used inside the weatherproofing system, documentation indicating that they comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic 2. Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content. 3.
 - Product Data for Credit MR5: Product data for regional materials indicating location and distance 4. from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.6 INFORMATIONAL SUBMITTALS

- Product Certificates: For glass and glazing products, from manufacturer. A.
- B. Preconstruction adhesion and compatibility test report.

1.7 QUALITY ASSURANCE

Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified A. insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

- Β. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program. C.
- D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
- Source Limitations for Glass: Obtain ultraclear float glass tinted float glass coated float glass laminated glass and insulating glass from single source from single manufacturer for each glass type. E.
- Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each F. product and installation method.
- G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - 1. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, 2. "Sloped Glazing Guidelines."
 - 3.
 - IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing." IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use." 4.
- Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. H. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

1.8 DELIVERY, STORAGE, AND HANDLING

- Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and A. glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid Β. hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

- Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel A. substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

PART 2 - PRODUCTS

2.1**GLASS PRODUCTS, GENERAL**

- Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed A. to comply with requirements indicated.
 - 1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 <Insert thickness designation>mm.
 - Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project. 2.
- Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Β. Kind FT heat-treated float glass is indicated, provide Kind HS heat-treated float glass, rule risk indicated roat glass, or heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- Thermal and Optical Performance Properties: Provide glass with performance properties specified, as C. indicated in manufacturer's published test data, based on procedures indicated below:

- 1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick of thickness indicated.
- 2. 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.
- 3. 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.
- Δ Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 **GLASS PRODUCTS**

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
- Β. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - 2. For uncoated glass, comply with requirements for Condition A.
 - 3. For coated vision glass, comply with requirements for Condition C (other coated glass).
- C. Required Regional Material Content: Provide 95% of total glass products (based on material cost) from sources that have been extracted, harvested, or recovered as well as manufactured within 500 miles of the project site.

2.3 **GLAZING GASKETS**

- Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain A. watertight seal, made from one of the following:
 - Neoprene complying with ASTM C 864. 1.
 - 2. EPDM complying with ASTM C 864.
 - 3. Silicone complying with ASTM C 1115.
 - Thermoplastic polyolefin rubber complying with ASTM C 1115. 4.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 - 1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

GLAZING SEALANTS 2.4

- General: Α.
 - 1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing 2. sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3.
 - Sealants used inside the weatherproofing system, shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24). Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of 4. Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Β. Class 100/50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 790.
 - GE Advanced Materials Silicones; SilPruf LM SCS2700. b.
 - May National Associates, Inc.; Bondaflex Sil 290. c.
 - d. Pecora Corporation; 890.

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- e. Sika Corporation, Construction Products Division; SikaSil-C990.
- f. Tremco Incorporated; Spectrem 1.
- C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.5 GLAZING TAPES

- A. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.6 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.7 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.
- 2.8 GLASS TYPES (see schedule at end of section)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches .
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Final Completion. Wash glass as recommended in writing by glass manufacturer.

| FULLY TEMPERED FLOAT GLASS | | | | | |
|----------------------------|---|---------------|-----------------------------|-------------------|--|
| Designation | Type 1 | | | | |
| Description | cription Clear, fully tempered, float glass | | | | |
| Thickness | 2kness 1/4" | | | | |
| Class | Class 1 (clear), Kind FT (fully tempered) | | | | |
| Performance C | Performance Characteristics | | | | |
| Visible Light | Transmittance | 88-90 percent | | | |
| Summer Daytime U-Value | | 1.02 - 1.13 | Winter Night time U-Value | 1.09 - 1.10 | |
| Shading Coefficient | | 0.98 - 1.00 | Outdoor Visible Reflectance | 8 percent maximum | |

END OF SECTION 088000

SECTION 088300 - MIRRORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:
 - 1. Film-backed glass mirrors qualifying as safety glazing.
- B. Related Sections:
 - 1. Division 08 Section "Glazing" for glass with reflective coatings used for vision and spandrel lites.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives, documentation indicating that they comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- D. Samples: For each type of the following products:
 - 1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 - Mirror Clips: Full size.
 Mirror Trim: 12 inches long.
 - 3. Mirror Trim: 12 inches long.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.
- C. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing film and substrates on which mirrors are installed.
- D. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- C. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.
- D. Glazing Publications: Comply with the following published recommendations:

MIRRORS

- 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
- 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- E. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.

DELIVERY, STORAGE, AND HANDLING 1.7

- Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage A. to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed Β. to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

1.8 PROJECT CONDITIONS

Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are A. maintained at levels indicated for final occupancy.

WARRANTY 1.9

- Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors A. 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 Final Completion.

PART 2 - PRODUCTS

2.1SILVERED FLAT GLASS MIRRORS

- Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process. A.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Arch Aluminum & Glass Co., Inc. a.
 - Avalon Glass and Mirror Company. b.
 - Binswanger Mirror; a division of Vitro America, Inc. c.
 - d. D & W Incorporated
 - Donisi Mirror Company. e.
 - f. Gardner Glass, Inc.
 - Gilded Mirrors, Inc. g. h.
 - Guardian Industries.
 - Head West. i.
 - Independent Mirror Industries, Inc. j. k.

 - Lenoir Mirror Company. Maran-Wurzell Glass & Mirror. 1.
 - National Glass Industries. m.
 - Stroupe Mirror Co., Inc. n.
 - Sunshine Mirror; Westshore Glass Corp. 0.
 - Virginia Mirror Company, Inc. p.
 - Walker Glass Co., Ltd. q.
- Clear Glass: Mirror Glazing Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible Β. light transmission.
 - 1. Nominal Thickness: 6.0 mm.

2.2 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- Β. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.

MIRRORS

- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Franklin International: Titebond Division. a.
 - b. Laurence, C. R. Co., Inc.
 - Macco Adhesives; Liquid Nails Division. c.
 - d. OSI Sealants, Inc.
 - Palmer Products Corporation. e.
 - f. Pecora Corporation.
 - Royal Adhesives & Sealants; Gunther Mirror Mastics Division. g. h.
 - Sommer & Maca Industries, Inc.
- D. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

2.3 MIRROR HARDWARE

- Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a A. glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, 1. respectively, and a thickness of not less than 0.04 inch.
 - Products: Subject to compliance with requirements, provide the following provide one of a. the following:
 - 1) Laurence, C. R. Co., Inc.; CRL Standard "J" Channel.
 - Sommer & Maca Industries, Inc.; Aluminum Shallow Nose "J" Moulding Lower Bar.
 - 2) 3) Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Shallow Nose "J"
 - Moulding Lower Bar.
 - Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, 2. respectively, and a thickness of not less than 0.04 inch.
 - a. Products: Subject to compliance with requirements, provide one of the following :
 - 1) Laurence, C. R. Co., Inc.; CRL Deep "J" Channel.
 - Sommer & Maca Industries, Inc.; Aluminum Deep Nose "J" Moulding Upper Bar. Sommer & Maca Industries, Inc.; Heavy Gauge Aluminum Deep Nose "J" Moulding 2) <u>3</u>) Lower Bar.
 - 3. Finish: Clear bright anodized.
- Β. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

2.4 FABRICATION

- Mirror Edge Treatment: Flat polished. A.
 - Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric 1. penetration of glass coating.
 - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- B. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

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 mirror mastic with existing finishes or primers.
- 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. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Wall-Mounted Mirrors: 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. Top and Bottom Aluminum J-Channels: Provide setting blocks 1/8 inch thick by 4 inches long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than 1/4 inch wide by 3/8 inch long at bottom channel.
 - 2. Install mastic as follows:
 - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - b. 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. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.

3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Final Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 088300

SECTION 092400 - PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 **RELATED DOCUMENTS7**

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

1.2 SUMMARY

1.

Section Includes: A.

- Exterior vertical stucco surfaces including walls, and trim bands.
- 2. 3. Pressure cleaning of substrate
- Removal and replacement of delaminated stucco Exterior metal doors and metal vent louvers
- 4.
- 5. Remove and replace all deteriorated caulking at stucco and dissimilar materials.
- Repair of stucco cracks 6.
- Recoating of existing stucco. 7.
- Β. **Related Sections:**
 - Section 042200 "Concrete Unit Masonry" for structural, load-bearing CMU that support portland 1. cement plaster.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- Β. LEED Submittals:
 - Product Data for Credit MR 4: For products having recycled content, documentation indicating 1. percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, C. sections, details of components, and attachments to other work.
- D. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.
- Samples for Verification: For each type of factory-prepared colored textured finish coat indicated; 12 by E. 12 inches, and prepared on rigid backing.
- 1.4 QUALITY ASSURANCE
 - Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products A. with appropriate markings of applicable testing agency.
 - Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another 1. qualified testing agency.
 - Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical Β. to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
 - Mockups: Before plastering, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic C. effects and set quality standards for materials and execution.
 - Install mockups for each type of finish indicated. 1.
 - For interior plasterwork, simulate finished lighting conditions for review of mockups.
 - 2. 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
 - D. Preinstallation Conference: Conduct conference at Project site.
 - E. Manufacturer Requirements:
 - Coatings manufacturer for minimum of 20 years.
 - Manufacturing facilities ISO 9001-14001 certified. 2.
 - 3. Local company-employed representative of coatings manufacturer.

F. **Contractor Requirements:**

- 1.
- 2.
- Licensed, insured, and engaged in application of coatings for 5 years. Knowledgeable in proper use and handling of stucco coatings and acceptable to the manufacturer. Employ skillful laborers who are experienced and knowledgeable in wall coating application, and <u>3</u>. familiar with requirements of specified work. Contractor shall maintain on site a foreman or supervisor to ensure work meets specification requirements.
- 4.
- Successful completion of a minimum of 3 projects of similar size and complexity. Contractor is responsible for all safety measures and must conform to OSHA requirements. Cordon off areas that will be coated to ensure safety. 5.
- Provide the proper equipment, manpower and supervision on the job to install the coating in compliance with the specifications, details and project plans. 6.
- 7. Subcontracting of work to non-company employees is not permitted.

G. Workmanship

- 1. 2.
- All materials shall be applied free of runs, sags, streaks, shiners and exhibit uniform finish. Perform adhesion tests where requested by Owner to ensure proper bond. Perform sample areas of all products for substrate compatibility prior to commencement of painting 3. of that material.

1.5 DELIVERY, STORAGE, AND HANDLING

- Store materials inside under cover and keep them dry and protected against damage from weather, direct A. sunlight, surface contamination, corrosion, construction traffic, and other causes.
- Β. Protect coatings (pails) from temperatures in excess of 90 deg F. Do not store in direct sunlight.

1.6 PROJECT CONDITIONS

- Comply with ASTM C 926 requirements. A.
- Interior Plasterwork: Maintain room temperatures at greater than 40 deg F for at least 48 hours before Β. plaster application, and continuously during and after application.
 - Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; 1. prevent concentrated or uneven heat on plaster. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster
 - 2. in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
- C. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind. 2
 - Apply plaster when ambient temperature is greater than 40 deg F.
 - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental D. conditions for applying finishes.

1.7 PROTECTION AND STAGING

- All areas of the grounds, building, corridors, parking areas, driveways, and sideway areas shall be left clean A. and unaffected.
- Windows: if during project, any glass, windows, or sliding doors are broken through contractor negligence, Contractor will replace promptly. If this cannot be done in the same day then the window space will be Β. properly covered against damage until repair can be done. Repair costs shall be borne by Contractor.

PART 2 - PRODUCTS

- 2.1METAL LATH
 - A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Alabama Metal Industries Corporation; a Gibraltar Industries company. a.
 - b. CEMCO.
 - Clark Western Building Systems. c.
 - d. Dietrich Metal Framing; a Worthington Industries company.

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- MarinoWARE. e. f
 - Phillips Manufacturing Co.
- 2. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent. Diamond-Mesh Lath: Self furring 3.4 lb/sq. yd.
- 3
- B. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper.
 - Provide paper-backed lath unless otherwise indicated. 1.

2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- Β. Metal Accessories:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Alabama Metal Industries Corporation; a Gibraltar Industries company. a.
 - b. CEMCO.
 - Clark Western Building Systems. c.
 - Dietrich Metal Framing; a Worthington Industries company. MarinoWARE. d.
 - e.
 - Phillips Manufacturing Co.
 - 2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.
 - 3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
 - External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, 4. hot-dip galvanized zinc coating.
 - 5. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
 - Small nose cornerbead with expanded flanges; use unless otherwise indicated. a.
 - 6. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
 - Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective 7. tape on plaster face of control joint.

2.3 MISCELLANEOUS MATERIALS

- Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, A. lath, or accessories.
- Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, Β. manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness D. of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.

2.4 PLASTER MATERIALS

- A. Coatings Manufacturers: Sto Corp. Atlanta, Ga. (The following materials are the basis of design)
- Β. Stucco Repairs: Sto Overhead Mortar CR702
- C. Surface Primer: Sto Hot Prime 805
- D. Surface Conditioner: Sto Plex W
- E. Acrylic Paint Coatings:

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- Sto Silco Lastic 222: High solids elastomeric coating. Tinted to desired color. 1.
- 2. Sto Lotusan 216: Acrylic based coating. Tinted to desired color.
- Colors: As indicated on drawings.
- F. Other Coatings: Metal Primer: Spot prime with Sto Hot Prime 805
- G. Crack Filler: Sto Flexible Crack Filler CR214: Gun-grade elastomeric crack filling material
- H. Sealant: Urethane Sealant: Provide Dyna Trol II by Pecora Corp.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- Β. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by A. plastering.
- Β. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION. GENERAL

Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations A. from listing organization and publication indicated on Drawings.

3.4 INSTALLING METAL LATH

- Expanded-Metal Lath: Install according to ASTM C 1063. A.
 - Partition Framing and Vertical Furring: Install self-furring diamond-mesh lath. Flat-Ceiling and Horizontal Framing: Install self furring diamond-mesh lath. $\frac{1}{2}$

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- Β. Reinforcement for External Corners:
 - 1. Install lath-type, external-corner reinforcement at exterior locations.
- C. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - Vertical Surfaces: 144 sq. ft.. a.
 - Horizontal and other Nonvertical Surfaces: 100 sq. ft. b.
 - At distances between control joints of not greater than 18 feet o.c.
 - 2. 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.
 - 5 Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 NEW PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
 - Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface. 1.
 - Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal 2. frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.

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- 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- Β. Bonding Compound: Apply on unit masonry plaster bases.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry; 3/4-inch thickness.
 - 1. Portland cement mixes.
- D. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; 1/2 inch thick.
 - 1. Portland cement mixes.

3.7 STUCCO REPAIRS

- A. Remove all damaged and or delaminated stucco at locations indicated.
- Β. Replace the removed areas using Sto Overhead Mortar.
 - 1. Overhead Mortar can be built up to 2" in one lift.
- C. Apply a coat of Sto Hot Prime over repaired areas.
- D. Spray apply a coat of Sto Essence Fine or Medium to match the existing texture.
- E. Detail Work
 - 1. Window, Door and Pan Flashing sealant
 - Remove and replace all deteriorated sealants and re-caulk at all window/stucco surfaces, at a. existing door frames, expansion joints and pan flashing at stucco surfaces with specified sealant. Prepare surfaces according to sealant manufacturer's label instructions and tool sealant to form a tight seal between dissimilar material and stucco. Insure sealant is properly cured prior to priming.
 - Junction Details: Apply and tool a liberal amount of patching compound or form a cant bead with appropriate sealant wherever there is a change in direction where two walls abut or at column/wall 2. intersection at all these locations where sealant is worn, loose, or defective.
 - 3.
 - Inspect all through-wall penetrations including lighting, signage, HVAC piping, or water pipes for a tight watertight seal. Repair if necessary with appropriate sealant. Stucco Cracks: Hairline stucco cracks up to 1/8 inch can be repaired using Sto Flexible Crack Filler. Apply filler directly into cleaned and dry cracks, then using knife, strike excess material flush and feather into existing texture of the surface. Cracks greater than 1/8-inch are to be routed to $\frac{1}{4} \times \frac{1}{4}$ inch, flushed clean and the specified one-part urethane sealant shall be applied and tooled flush. 4. Replace stucco as needed and finish to match existing texture. All delaminated stucco shall be cut out and removed. Apply stucco in two coat application and texture to match existing profile and texture. Spot prime stucco patches with Sto Hot Prime 805 prior to painting later with Sto Essence Fine finish coat material.
 - Cover all exterior light fixtures and all horizontal walking surfaces from paint spills. 5.
 - Contractor is responsible to move all items away from the buildings and site walls to permit access 6 to areas to be painted.

3.8 PAINT SCHEDULE

Exterior vertical stucco walls: One coat Sto Plex W over entire surface. Two coats Sto Lotusan on walls. A.

3.9 INSTALLATION OF EXTERIOR COATINGS

- Examine substrate and conditions under which materials will be listed. Do not proceed until unsatisfactory A. conditions are corrected.
- Protect adjacent areas and landscaping, sideways and driveways from contact due to pressure cleaning, Β. mixing, and handling of materials.
- C. Surface Preparation: Comply with manufacturer's printed instructions and the following.
 - 1. Bleach wash all mildew areas so they are free of all algae, mold or mildew. Solution Shall be one part bleach to 3 parts water. Spray all mildew areas and allow to remain on wall 15-minutes. Thoroughly rinse surface of solution and allow to dry. Wash all surrounding foliage and plants to minimize damage to them from bleach solution.
 - 2. Pressure clean with minimum 3000-psi pressure washer all surfaces to be coated of bond-inhibiting materials including fungus, mildew, dirt, and dust, laitance, and loose aged coatings. Hand scrap

or wire brush where required to remove loose paint or scaling material. Glossy surfaces of old paint films must be clean and dull before recoating. Power sanding of these surfaces is recommended. Surfaces exhibiting efflorescence shall be treated with acid solution and then rinsed completely with clean water. Surface must be clean and dry at time of primer application.

- D. Mixing: Comply with manufacturer's printed instructions and the following.
 - Precondition to temperature of 70-80*F prior to application.
 - Agitate using a mechanical mixer to uniform consistency. Do not over-mix. Sto Plex W: No Mixing apply undiluted
 - 1. 2. 3.
 - 4. Primer: Mix undiluted
 - 5. Finish coat: Mix undiluted
- E. Application of acrylic coating materials: Comply with manufacturer's printed instructions and the following:
 - Apply Sto Plex W soon after surface has been cleaned properly to prevent contamination of the substrate. Insure substrate is clean, dry and pH is below 10 or use Hot Prime. Paint only in dry weather. Stop exterior work early enough to permit paint film to set up before rain 1.
 - 2. or condensation occurs.
 - or condensation occurs. Where required, apply Sto Plex W uniformly by roller or spray. Allow material to penetrate surface. Do not apply in excess. Sto Plex W should always dry dull no Sheen. Apply so surface is free of pinholes, runs, sags, shiners or lap marks. Allow to dry completely. Where specified apply Sto Silcolastic uniformly by roller or spray. Do not apply in excess. Apply at a minimum rate of 12 wet mils. Allow to dry completely. Apply second coat uniformly at a minimum rate of 12 wet mils. 3.
 - 4. minimum rate of 12 wet mils.
 - Where specified apply Sto Lotusan uniformly by roller or spray. Apply at a rate of 5 to 7 wet mils per coat. Allow to dry completely. 5.

3.10 CLEANING

- Keep site free from construction debris. Set-up area and work areas shall be cleaned at the end of each Α. Work day of trash, debris and dirty or left-over supplies.
- Clean daily spills and drips from site. Contractor shall maintain daily regimen of site clean-up of all such Β. items at end of each day.
- Clean-up and repair of spillage shall be completed prior to final payment. All areas that have been damaged C. due to spillage or over-spray shall be repaired at cost to Contractor.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes: Interior gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - 3. Product Data for Credit IEQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.
- C. Samples: For the following products:
 - 1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 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.

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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. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 100 percent.
- B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.
- C. 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. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. American Gypsum.
 - 2. CertainTeed Corp.
 - 3. Georgia-Pacific Gypsum LLC.
 - 4. Lafarge North America Inc.
 - 5. National Gypsum Company.
 - 6. PABCO Gypsum.
 - 7. Temple-Inland.
 - 8. USG Corporation.
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
 - 1. Thickness: 1/2 inch.
 - 2. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch, Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
 - 1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
 - 2. Shapes:
 - a. Cornerbead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. L-Bead: L-shaped; exposed long flange receives joint compound.
 - d. Expansion (control) joint.
2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - 3. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 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 drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 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.
 - 2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.

2. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. 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.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

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K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: All vertical surfaces unless otherwise indicated.
 - 3. Moisture- and Mold-Resistant Type: All walls and ceilings within toilet spaces.
- B. Single-Layer Application:

A.

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
- 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in Section 099123 "Interior Painting."

3.6 **PROTECTION**

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 095113 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

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. LEED Submittals:
 - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - 2. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
 - 3. Laboratory Test Reports for Credit EQ 4: For sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.
- D. Samples for Initial Selection: For components with factory-applied color finishes.
- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Panel: Set of 6-inch- square 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.

1.5 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

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- 1. Acoustical Ceiling Panels: 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.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7. All new ceilings installed shall be installed to comply with Seismic Class 'C' ceiling system requirements.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
 - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
 - 2. Suspension System: Obtain each type from single source from single manufacturer.
- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- C. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 65% pre-consumer and 15% post-consumer.
- D. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- E. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

- 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.
- F. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL PANELS APC-1

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc. Fine Fissured #1728A or comparable product by one of the following:
 - 1. CertainTeed Corp.
 - 2. Chicago Metallic Corporation.
 - 3. Tectum Inc.
 - 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Classification: Providepanels complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type and Form: Type III, mineral base with painted finish; Form 2, nodular.
 - 2. Pattern: CE
- C. Color: White
- D. NRC: Not less than 0.55
- E. CAC: Not less than 33
- F. Edge/Joint Detail: square, butt edges.
- G. Thickness: 5/8 inch
- H. Modular Size: 24 by 24 inches
- I. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- 2.4 METAL SUSPENSION SYSTEMS, GENERAL
 - A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - B. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
 - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
 - C. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

- 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch-(2.69-mm-) diameter wire.
- E. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in place.
- F. Hold-Down Clips: Where required by ceiling tile manufacturer's tested assembly to meet seismic ceiling 'C' assembly, provide manufacturer's standard hold-down clips.

2.5 METAL SUSPENSION SYSTEM APC-1

- A. Manufacturers: Subject to compliance with requirements, provide product by one of the following:
 - 1. Armstrong World Industries, Inc.
 - 2. CertainTeed Corp.
 - 3. Chicago Metallic Corporation.
 - 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Wide-Face, Capped, Double-Web,Hot-Dip Galvanized, G60 (Z180), Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; hot-dip galvanized according to ASTM A 653/A 653M, G60 (Z180) coating designation; with prefinished, cold-rolled, 15/16-inch-(24-mm-) wide aluminum caps on flanges.
 - 1. Structural Classification: Intermediate-duty system.
 - 2. Face Design: Flat, flush.
 - 3. Face Finish: Painted white.

2.6 ACOUSTICAL SEALANT

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Acoustical Sealant for Exposed and Concealed Joints:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. USG Corporation; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
 - 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
 - 2. Acoustical sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, 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, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - 5. 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.
 - 6. Do not attach hangers to steel deck tabs.
 - 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - 8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 - 9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - 1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - 2. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 - 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - 1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.

- b. Install panels with pattern running in one direction parallel to long axis of space.
- 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
- 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 - 1. Compliance of seismic design.
- B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections and prepare test reports.
- C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.5 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095113

SECTION 096400 - WOOD FLOORING

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. Factory-finished wood flooring.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For wood flooring installation adhesives, documentation including printed statement of VOC content.
 - 2. Product Data for Credit IEQ 4.3: For wood flooring installation adhesives, documentation including printed statement of VOC content.
 - 3. Product Data for Credit IEQ 4.3: For wood flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
 - 4. Laboratory Test Reports for Credit IEQ 4: For adhesives composite wood products and wood flooring systems, documentation indicating that products complywith California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 5. Product Data for Credit MR 6: For rapidly renewable products document material cost and that product is classified as rapidly renewable.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.
- D. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Wood Flooring: Equal to 2 percent of amount installed for each type of wood flooring indicated.

1.5 QUALITY ASSURANCE

- A. Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.
 - 1. Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.
- C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Ôpen sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Wood floors shall comply with requirements of FloorScore Standard.
- B. Low-Emitting Materials: Wood flooring systems shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 FACTORY-FINISHED WOOD FLOORING

- A. Engineered-Wood Flooring: HPVA EF, except bonding agent contains no urea formaldehyde, that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated by manufacturer's designation in Finish Legend Drawings or comparable product by one of the following:
 - a. Teragren
 - b. Mohawk Industries (Basis of design)
 - c. EcoTimber.
 - 2. Species: Bamboo
 - 3. Hardness: Minimum 3200 reading per ASTM D1037.
 - 4. Thickness: 3/8 inch.
 - 5. Construction: Solid composite (match aesthetic of flooring construction of product indicated in finish legend.)
 - 6. Face Width: 3-3/4 inches.
 - 7. Length: Manufacturer's standard varying lengths of 24, 36 and 48 inches
 - 8. Edge Style: Square.
 - 9. Finish: Aluminum oxide/polyurethane finish
 - a. Color: As indicated by manufacturer's designation in Finish Legend
- 2.3 ACCESSORY MATERIALS
 - A. Wood Underlayment: As specified in Section 061600 "Sheathing."
 - B. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.

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- C. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines: Wood Flooring."
- D. Thresholds and Saddles: To match wood flooring. Tapered on each side.
- E. Reducer Strips: To match wood flooring. 2 inches wide, tapered, and in thickness required to match height of flooring.
- F. Wood Air Vents and Grilles: To match wood flooring and in sizes and design indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
- B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines: Wood Flooring."
- B. Wood Subfloor: Install according to requirements in Section 061600 "Sheathing."
- C. Engineered-Wood Flooring: Nail or staple.

3.4 **PROTECTION**

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
 - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

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SECTION 096519 - RESILIENT TILE FLOORING

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. Vinyl composition floor tile.
- B. Related Sections:
 - 1. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
 - 2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
 - 3. Product Data for Credit IEQ 4.3: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.
 - 4. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
 - 5. Product Data for Credit MR5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.
- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 1. Show details of special patterns.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 MATERIALS MAINTENANCE 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 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.5 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.6 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 (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.7 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during 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. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore Standard.

2.2 VINYL COMPOSITION FLOOR TILE

- A. Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. AB ColorPlus, American Biltrite (Canada) Ltd.;.
 - 2. Armstrong World Industries, Inc.
 - 3. Congoleum Corporation
 - 4. Mannington Mills, Inc.
 - 5. Tarkett, Inc.
 - 6. Vinylasa Tile, Distributed by American Tile Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As indicated by manufacturer's designations in Finish Schedule. If a different manufacturer, then Architect will select from full range of industry colors.

2.3 INSTALLATION MATERIALS

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

- 1. Adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
- D. 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.
- E. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

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 square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- 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, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor 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 flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile 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, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096816 - SHEET CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- Section Includes: A.
 - 1. Tufted carpet.
- Β. **Related Requirements:**
 - Section 012300 "Alternates" for description of alternates which affect the scope of sheet carpeting. Section 024119 "Selective Demolition" for removing existing floor coverings.
 - 2.

1.3 PREINSTALLATION MEETINGS

- Preinstallation Conference: Conduct conference at Project site. A.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - Review delivery, storage, and handling procedures. a.
 - Review ambient conditions and ventilation procedures. b.
 - Review subfloor preparation procedures. c.
 - d Insert agenda items.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following, including installation recommendations for each type of substrate:
 - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - Carpet Cushion: For each type indicated. Include manufacturer's written data on physical 2. characteristics and durability.
- Β. **LEED Submittals:**
 - 1. Product Data for Credit EQ 4.3:
 - For carpet, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program. a.
 - For carpet cushion, documentation indicating compliance with testing and product requirements of CRI's "Green Label" program. b.
 - For installation adhesive, including printed statement of VOC content. c.
 - Laboratory Test Reports for Credit EQ 4: For carpet and installation adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions 2. from Various Sources Using Small-Scale Environmental Chambers."
- Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and C. in schedules.
 - 1.
 - Carpet: 12-inch- square Sample. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.
 - 2. 3. Carpet Cushion: 6-inch- square Sample. Carpet Seam: 6-inch Sample.
 - 4.
 - Mitered Carpet Border Seam: 12-inch- square Sample. Show carpet pattern alignment. 5.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- Β. Product Test Reports: For carpet, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 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.

1.7 MAINTENANCE MATERIAL SUBMITTALS

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

1.8 QUALITY ASSURANCE

A. Fire-Test-Response Ratings: Where indicated, provide carpet identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.11 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 does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on finish legend in drawings orr comparable product by one of the following:
 - 1. Miliken 2. Mohawk C
 - . Mohawk Commercial
- B. Color: Match Architect's samples.
- C. Pattern: Match Architect's samples.
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: Solution q nylon. (100% solution died)
- F. Pile Characteristic: graphic loop
- G. Pile Thickness: 0.143 inches for finished carpet per ASTM D 6859.

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- H. Total Thickness: 0.306 inches.
- I. Stitches: 10 per inch.
- J. Gage: 1/10 per inch.
- K. Pattern repeat: 23/32" x 6 18/32"
- L. Total Weight: 28 oz./sq. yd. for finished carpet.
- M. Primary Backing: Synthetic backing material.
- N. Secondary Backing: Manufacturer's standard material.
- О. Backcoating: Manufacturer's standard material
- Ρ. Backing System: Classicbac
- Q. Width: 12 feet.
- R. Applied Soil-Resistance Treatment: Manufacturer's standard material.
- S. Antimicrobial Treatment: Manufacturer's standard material.
- Τ. Performance Characteristics: As follows:
 - 1.
 - 2.
 - 3.
 - Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174. Electrostatic Propensity: Less than 3.5 kV per AATCC 134. Emissions: Provide carpet that complies with testing and product requirements of CRI's "Green Label Plus" program. Emissions: Provide carpet that complies with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." 4.

2.2 INSTALLATION ACCESSORIES

- Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation A. provided or recommended by carpet manufacturer.
- Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions Β. indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 - Use adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24). 1.
 - Use adhesives that comply with the product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." 2.
- 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.
- Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height D. required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet A. performance. Examine carpet for type, color, pattern, and potential defects.
- Β. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
 - Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing 1. bond and moisture tests recommended by carpet manufacturer.
 - 2. Subfloor finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" for slabs receiving carpet.

- 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. For wood subfloors, verify the following:
 - 1. Underlayment over subfloor complies with requirements specified in Section 061000 "Rough Carpentry."
 - 2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," 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. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet cushion manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
 Stair Installation: Comply with CRI 104, Section 13, "Carpet on Stairs" for stretch-in installation.
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Do not bridge building expansion joints with carpet.
- D. 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.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet 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 manufacturer.

END OF SECTION 096816

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SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Wood.
 - 2. Steel.
 - 3. Galvanized metal.

B. Related Requirements:

- 1. Section 012300 "Alternates" for alternate description affecting exterior painting scope of work.
- 2. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
- 3. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 3. VOC content.

1.5 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. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 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.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Duron, Inc.
 - 3. ICI Paints.
 - 4. PPG Architectural Finishes, Inc.
 - 5. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide products that match MPI System listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- C. Colors: As indicated in a finish schedule
 - 1. 10 percent of surface area will be painted with deep tones.

2.3 PRIMERS/SEALERS

A. Wood knot Sealer: Sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2.4 PRIMERS

A. Primer, Alkyd for Exterior Wood: (MPI #5)

2.5 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: (MPI #79)
- B. Primer, Galvanized, Water Based: (MPI #134)

2.6 WATER-BASED PAINTS

- A. Latex, Exterior Semi-Gloss (Gloss Level 5): (MPI #11)
- B. Light Industrial Coating, Exterior, Water Based, Gloss (Gloss Level 6): (MPI #164)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- E. 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 7/NACE No. 4, "Brush-off Blast Cleaning."
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- G. 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.

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed to view:
 - a. Uninsulated metal piping.
 - b. Pipe hangers and supports.
 - c. Metal conduit.
 - d. Tanks and electrical gear that do not have factory-applied final finishes.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

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

3.6 EXTERIOR PAINTING SCHEDULE

- A. Wood Substrates: Including wood trim, architectural woodwork, doors, windows and wood siding.
 - 1. Latex over Alkyd Primer System:
 - a. Prime Coat: Primer, alkyd for exterior wood.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.

c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

B. CMU Substrates:

- 1. Latex System:
 - a. Prime Coat: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5).

C. Steel Substrates:

- 1. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, alkyd, anti-corrosive for metal or
 - b. Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified.
 - c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - d. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6).

D. Galvanized-Metal Substrates:

- 1. Latex System:
 - a. Prime Coat: Primer, galvanized, water based.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior gloss (Gloss Level 6).

END OF SECTION 099113

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SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

RELATED DOCUMENTS 1.1

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

1.2 SUMMARY

- Section includes surface preparation and the application of paint systems on interior substrates. the A. following interior substrates:
 - Steel. 1.
 - 2. Galvanized metal.
 - 3. Gypsum board.
 - 4. Wood trim
 - 5 Wood doors

1.3 DEFINITIONS

- Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523. A.
- Β. 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. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. 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. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

Product Data: For each type of product. Include preparation requirements and application instructions. A.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- Furnish extra materials that match products installed and that are packaged with protective covering for A. storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures A. continuously maintained at not less than 45 deg F.
 - Maintain containers in clean condition, free of foreign materials and residue.
 - 1. 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F. A.
- Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the Β. dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1MANUFACTURERS

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

- Benjamin Moore & Co. (Basis of design)
- 1. 2. 3. Duron, Inc.
- ICI Paints.
- 4. PPG Architectural Finishes, Inc. 5
- Sherwin-Williams Company (The).
- Β. Products: Subject to compliance with requirements, provide products that match MPI system listed in other Part 2 articles for the paint category indicated.
- 2.2 PAINT, GENERAL
 - A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer,
 - based on testing and field experience. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated. 2.
 - Β. Colors: As indicated in a finish schedule
 - 1. 10 percent of surface area will be painted with deep tones.
- 2.3 PRIMERS/SEALERS
 - A. Primer Sealer, Latex, Interior: (MPI #50)
 - Β. Primer Sealer, Alkyd, Interior: (MPI #45.)
- 2.4 METAL PRIMERS
 - Primer, Alkyd, Anti-Corrosive, for Metal: (MPI #134) A.
- 2.5 WATER-BASED PAINTS
 - Latex, Interior, Flat, (Gloss Level 1): (MPI #134) A.
 - Β. Latex, Interior, (Gloss Level 3): (MPI #52)
 - C. Latex, Interior, Semi-Gloss, (Gloss Level 5): (MPI #54)

PART 3 - EXECUTION

- 3.1 **EXAMINATION**
 - Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum A. moisture content and other conditions affecting performance of the Work.
 - Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows: Β.
 - 1. Gypsum Board: 12 percent.
 - C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
 - D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 - E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to A. substrates indicated.
- Β. 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.

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- After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any. 1.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer. but not less than the following:
 - SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning." SSPC-SP 11, "Power Tool Cleaning to Bare Metal." 1.
- Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and E. paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. 2.
 - Use applicators and techniques suited for paint and substrate indicated. 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. Primers specified in painting schedules may be omitted on items that are factory primed or factory
 - 5. finished if acceptable to topcoat manufacturers.
- Β. 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.
- Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller D. tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
 - 1. Paint the following work where exposed in equipment rooms:
 - a. Uninsulated metal piping.
 - b. Pipe hangers and supports.
 - Metal conduit. c.
 - d. Tanks that do not have factory-applied final finishes.
 - Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other e. paintable jacket material.
 - 2. Paint the following work where exposed in occupied spaces:
 - a. Uninsulated metal piping.
 - Pipe hangers and supports. b.
 - Metal conduit. c.
 - d. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material. Other items as directed by Architect.
 - e.
 - 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 CLEANING AND PROTECTION

- At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site. A.
- Β. 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.

3.5 INTERIOR PAINTING SCHEDULE

- Steel Substrates: (doors, frames, exposed steel) A.
 - 1. Latex over Alkyd Primer System:
 - Prime Coat: Primer, alkyd, anti-corrosive, for metal or a.
 - Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified. b. c.
 - Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5).
- Β. Gypsum Board: (drywall ceilings)
 - 1. Latex System:
 - Prime Coat: Latex, interior, matching topcoat. a.
 - Intermediate Coat: Latex, interior, matching topcoat. b.
 - Topcoat: Latex, interior, flat, (Gloss Level 1). c.
- C. Gypsum Board: (Walls)
 - 1. Latex System:
 - a.
 - Prime Coat: Latex, interior, matching topcoat. Intermediate Coat: Latex, interior, matching topcoat. b.
 - Topcoat: Latex, interior, flat, (Gloss Level 1). c.
- D. Wood Substrates: Including wood trim, architectural woodwork, doors, and windows.
 - 1. Latex over Alkyd Primer System:
 - Prime Coat: Primer sealer, alkyd, interior a.
 - Intermediate Coat: Latex, interior, matching topcoat. Topcoat: Latex, interior, (Gloss Level 5) b.
 - C.

END OF SECTION 099123

SECTION 101100 - VISUAL DISPLAY SURFACES

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: Markerboards.

1.3 DEFINITIONS

- A. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
- B. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
 - 1. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.
 - 2. Include computer system requirements for electronic markerboards.

B. LEED Submittals:

- 1. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that the product contains no urea formaldehyde.
- 2. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of panel joints.
 - 2. Show locations of special-purpose graphics for visual display surfaces.
 - 3. Include sections of typical trim members.
- D. Samples for Initial Selection: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
 - 1. Actual sections of porcelain-enamel face sheet.
 - 2. Fabric swatches of vinyl- and polyester-fabric-faced tack assemblies.
 - 3. Include accessory Samples to verify color selected.
- E. Samples for Verification: For each type of visual display surface indicated.
 - 1. Visual Display Surface: Not less than 8-1/2 by 11 inches, mounted on substrate indicated for final Work. Include one panel for each type, color, and texture required.
 - 2. Trim: 6-inch-long sections of each trim profile.
 - 3. Accessories: Full-size Sample of each type of accessory.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.
- B. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

A. Source Limitations: Obtain visual display surfaces from single source from single manufacturer.

- Β. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - $\frac{1}{2}$. Flame-Spread Index: 25 or less.
 - Smoke-Developed Index: 450 or less.

1.7 DELIVERY, STORAGE, AND HANDLING

- Deliver factory-built visual display surfaces, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel A. size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.
- Β. Store visual display surfaces vertically with packing materials between each unit.

PROJECT CONDITIONS 1.8

- A. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- Β. Field Measurements: Verify actual dimensions of construction contiguous with visual display surfaces by field measurements before fabrication.
 - 1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.9 WARRANTY

- Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer A. agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - Surfaces exhibit crazing, cracking, or flaking. b.
 - 2. Warranty Period: 50 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1MATERIALS, GENERAL

- A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Claridge Products and Equipment, Inc. a.
 - b. PolyVision Corporation; a Steelcase company.
 - 2. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
- Β. Hardboard: ANSI A135.4, tempered.
- C. Particleboard: ANSI A208.1, Grade M-1., made with binder containing no urea formaldehyde.
- D. Fiberboard: ASTM C 208.
- E. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.2 MARKERBOARD ASSEMBLIES

- Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of A. three-ply construction consisting of backing sheet, core material, and 0.021-inch- thick, porcelain-enamel face sheet with low-gloss finish.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- Bangor Cork Company, Inc. a.
- Best-Rite Manufacturing. b.
- Claridge Products and Equipment, Inc. c. d.
- Ghent Manufacturing, Inc. Marsh Industries, Inc.; Visual Products Group. e.
- PolyVision Corporation; a Steelcase company. f
- 2. Manufacturer's Standard Core: Minimum 1/4 inch thick, with manufacturer's standard moisture-barrier backing.
- 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.3 MARKERBOARD ACCESSORIES

- A. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch thick, extruded aluminum; standard size and shape.
 - 1. Factory-Applied Trim: Manufacturer's standard.
- Β. Chalktray: Manufacturer's standard, continuous.
 - 1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

2.4 FABRICATION

- Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to A. core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- Β. Visual Display Boards: Factory assemble visual display boards unless otherwise indicated.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
- C. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
 - Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect. 1.
 - 2. Provide manufacturer's standard vertical-joint spline system between abutting sections of markerboards.
 - Where size of visual display boards or other conditions require support in addition to normal trim, 3. provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- D. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.5 GENERAL FINISH REQUIREMENTS

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

2.6 ALUMINUM FINISHES

- Color Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker. A.
- 2.7VISUAL DISPLAY SURFACE SCHEDULE
 - A. Visual Display Board 101100.A: Factory assembled.
 - 1. Markerboard: Porcelain-enamel markerboard assembly.

- Color: White. a.
- Corners: Square.
- 2. 3. Width: As indicated on Drawings. Height: 4'-0"
- 4.
- 5. Mounting: Wall
- Mounting Height: 2'-0" AFF 6.
- Factory-Applied Aluminum Trim: with clear anodic finish. 7.
 - Color: Clear annodized finish a.
- 8. Accessories:
 - Chalktray: Solid type. a.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work. A.
- Examine roughing-in for electrical power systems to verify actual locations of connections before Β. installation of motor-operated, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display surfaces.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- Comply with manufacturer's written instructions for surface preparation. A.
- Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew. Β.

3.3 INSTALLATION, GENERAL

- General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if A. not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- 3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES
 - Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display A. boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.

CLEANING AND PROTECTION 3.5

- Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label A. to visual display surface in each room.
- Β. Touch up factory-applied finishes to restore damaged or soiled areas.
- Cover and protect visual display surfaces after installation and cleaning. C.

END OF SECTION 101100
SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Dimensional characters.
 - 2. Panel signs.
- B. Related Sections include the following:
 - 1. Division 01 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
 - 2. Division 22 Section "Identification for Plumbing Piping and Equipment for labels, tags, and nameplates for plumbing systems and equipment.
 - 3. Division 23 Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
 - 4. Division 26 Sections for electrical service and connections for illuminated signs.
 - 5. Division 26 Section "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
 - 6. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of actual units or sections of units showing the full range of colors available for the following:
 - 1. Aluminum.
 - 2. Acrylic sheet.
 - 3. Polycarbonate sheet.
 - 4. Die-cut vinyl characters and graphic symbols. Include representative samples of available typestyles and graphic symbols.
- D. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
 - 1. Plaque Casting: 6 inches square including border.
 - 2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
 - 3. Aluminum: For each form, finish, and color, on 6-inch- long sections of extrusions and squares of sheet at least 4 by 4 inches .
 - 4. Acrylic Šheet: 8 by 10 inches for each color required.
 - 5. Polycarbonate Sheet: 8 by 10 inches for each color required.
 - 6. Panel Signs: Not less than 12 inches square including border.
 - 7. Trim Frame: 6-inch- long sections of each profile.

- 8. Accessories: Manufacturer's full-size unit.
- E. Sign Schedule: Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products or An employer of workers trained and approved by manufacturer
- B. 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.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Final Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- D. Steel:

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- 1. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi minimum yield strength.
- 2. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- E. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- F. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - 1. Impact Resistance: 16 ft-lbf/in. per ASTM D 256, Method A.
 - 2. Tensile Strength: 9000 lbf/sq. in. per ASTM D 638.
 - 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. per ASTM D 790.
 - 4. Heat Deflection: 265 deg F at 264 lbf/sq. in. per ASTM D 648.
 - 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- G. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 DIMENSIONAL CHARACTERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ACE Sign Systems, Inc.
 - 2. Advance Corporation; Braille-Tac Division.
 - 3. A. R. K. Ramos.
 - 4. ASI-Modulex, Inc.
 - 5. Bunting Graphics, Inc.
 - 6. Charleston Industries, Inc.
 - 7. Gemini Incorporated.
 - 8. Grimco, Inc.
 - 9. Innerface Sign Systems, Inc.
 - 10. Metal Arts; Div. of L&H Mfg. Co.
 - 11. Mills Manufacturing Company.
 - 12. Mohawk Sign Systems.
 - 13. Nelson-Harkins Industries.
 - 14. Signature Signs, Incorporated.
 - 15. Southwell Company (The).
 - 16. APCO Graphics, Inc.
- B. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
 - 1. Character Material: Aluminum.
 - 2. Thickness: 1 inches
 - 3. Color(s): Satin black
 - 4. Mounting: Concealed studs, noncorroding for substrates encountered.
 - 5. Font: Times New Roman

2.3 PANEL SIGNS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ACE Sign Systems, Inc.
 - 2. Advance Corporation; Braille-Tac Division.
 - 3. Allen Industries Architectural Signage
 - 4. Allenite Signs; Allen Marking Products, Inc.
 - 5. APCO Graphics, Inc.
 - 6. ASI-Modulex, Inc.
 - 7. Best Sign Systems Inc.
 - 8. Bunting Graphics, Inc.

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- 9. Fossil Industries, Inc.
- 10. Gemini Incorporated.
- 11. Grimco, Inc.
- 12. Innerface Sign Systems, Inc.
- 13. InPro Corporation
- 14. Matthews International Corporation; Bronze Division.
- 15. Mills Manufacturing Company.
- 16. Mohawk Sign Systems.
- 17. Nelson-Harkins Industries.
- 18. Seton Identification Products.
- 19. Signature Signs, Incorporated.
- 20. Supersine Company (The)
- B. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:
 - 1. Aluminum Sheet: 0.050 inch thick.
 - 2. Laminated, Aluminum-Faced Sheet: 0.020-inch- thick aluminum sheet laminated to each side of 0.197-inch-0.394-inch- thick, corrugated phenolic acrylic backing with painted edges.
 - 3. Laminated, Polycarbonate-Faced Sheet: 0.060-inch- <Insert dimension> thick, polycarbonate face sheet laminated to each side of 0.197-inch- 0.394-inch- <Insert dimension> thick phenolic backing.
 - 4. Acrylic Sheet: 0.060 inch 0.080 inch <Insert dimension> thick.
 - 5. PVČ Sheet: 0.060-inch- 0.080-inch- <Insert dimension> thick, extruded, high-impact PVC plastic in color to match face color with painted finish.
 - 6. Edge Condition: Square cut Beveled Bullnose.
 - 7. Corner Condition: Square Rounded to radius indicated.
 - 8. Mounting: Framed Unframed As indicated.
 - a. Wall mounted with two-face tape.
 - 9. Color: As indicated
 - 10. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- C. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching design indicated.
- D. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of transparent covers with paper inserts printed by Owner.
 - 1. Furnish insert material and software for creating text and symbols for PC-Windows computers for Owner production of paper inserts.
 - 2. Furnish insert material cut-to-size for changeable message insert.
- E. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - 1. Panel Material: Opaque acrylic sheet.
 - 2. Raised-Copy Thickness: Not less than 1/32 inch.
- F. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
 - 2. Engraved Metal: Fill engraved copy with enamel.
 - 3. Engraved Opaque Acrylic Sheet: Fill engraved copy with enamel.
 - 4. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with enamel. Apply opaque background color coating to back face of acrylic sheet.
- G. Subsurface Copy: Apply minimum 4-mil- thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.

- H. Subsurface Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet. Fill resulting copy with enamel. Apply opaque background color coating over enamel-filled copy.
- I. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils with pressure-sensitive adhesive backing. Apply copy to glass doors.
- J. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for three years for application intended.
 - 1. Color: As selected by Architect from manufacturer's full range
- K. Panel Sign Schedule (see sign types at end of this section:
 - 1. Sign Type 101400.C:
 - a. Sign Size: As indicated
 - b. Message Panel Material: As indicated
 - c. Message Panel Finish/Color: As indicated
 - d. Background Finish/Color: As indicated
 - e. Character Size: As indicated
 - f. Character Finish/Color: As indicated
 - g. Panel Sign Frame Finish/Color: As indicated
 - h. Text/Message: As indicated
 - i. Location: As indicated on drawings.
 - j. Quantity: See schedule on drawings.
- 2.4 ACCESSORIES
 - A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 FINISHES, GENERAL

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

2.7 ALUMINUM FINISHES

A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) polished (buffed) mechanical finish, complying with AAMA 611.

- B. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils, medium gloss.

2.8 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
- B. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.

2.9 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
 - 3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
 - 4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 - 5. Shim Plate Mounting: Provide 1/8-inch- thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - 6. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 7. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
- C. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

- D. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - 1. Flush Mounting: Mount characters with backs in contact with wall surface.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.
- 3.4 SIGNAGE SCHEDULE (as follows):
- 3.5 SIGN TYPES (as follows):

| А. | | | | | | | |
|--------------|--------------|-----|--|---|--|--|--|
| Door
Mark | Sign
Type | Qty | Сору | Notes | | | |
| 100A | F | 1 | Accessible Entrance Located on State Street Side of Building | | | | |
| 100A | | 1 | NO SMOKING WITHIN 25' OF
ENTRANCE | International symbol for No Smoking, exterior mounted sign adjacent door, minimum 10"x12" | | | |
| 101A | A | 1 | 101 | Paper insert | | | |
| 102A | А | 1 | 102 | Paper insert | | | |
| 103A | G | 1 | 103 Receptionist | | | | |
| 103B | G | 1 | 103 Receptionist | | | | |
| 104A | В | 3 | 104 Testing/Training Room | Provide additional signs at doors 104B & 104C | | | |
| 106A | А | 1 | 106 | Paper insert | | | |
| 107A | G | 1 | 001 Basement | | | | |
| 108A | F | 1 | Speak into microphone to notify receptionist | Locate sign adjacent 2 way communicator on exterior | | | |
| 108A | | 1 | NO SMOKING FACILITY/SITE | International symbol for No Smoking, exterior mounted sign adjacent door, minimum 10"x12" | | | |
| 109A | R | 1 | | Men, Women & Accessibility symbols | | | |
| 110A | G | 1 | 110 Mechanical | | | | |
| 112A | G | 1 | 112 Elevator Machine | | | | |
| 115A | G | 2 | 115 File Storage | Locate other sign at door 115B | | | |
| 117A | А | 1 | 117 | Paper insert | | | |
| 118A | А | 1 | 118 | Paper insert | | | |
| 119A | G | 1 | 119 File Storage | | | | |
| 120A | G | 1 | 120 Break Room | | | | |
| 122A | Α | 1 | 122 | Paper insert | | | |
| 123A | G | 1 | 123 Electrical/Data | | | | |
| 124A | А | 1 | 124 | Paper insert | | | |
| 126A | G | 1 | 126 Electrical | | | | |
| 127A | Е | 1 | Stair | | | | |
| 127B | | 1 | NO SMOKING FACILITY/SITE | International symbol for No Smoking, exterior mounted sign adjacent door, minimum 10"x12" | | | |
| 129A | R | 1 | | Men, Women & Accessibility symbols | | | |
| 130A | G | 1 | 130 Applications & Testing | | | | |
| 200B | A | 1 | 200 | Paper insert | | | |
| 201B | А | 1 | 201 | Paper insert | | | |
| 202B | А | 1 | 202 | Paper insert | | | |
| 203B | А | 1 | 203 | Paper insert | | | |
| 204A | Α | 1 | 204 | Paper insert | | | |
| 206A | R | 1 | | Men, Women & Accessibility symbols | | | |
| 207A | G | 1 | 207 Storage | | | | |
| 209A | А | 1 | 209 | Paper insert | | | |
| 210A | G | 1 | 210 Storage | | | | |
| 211A | G | 1 | 211 Mechanical | | | | |

| Door
Mark | Sign
Type | Qty | Сору | Notes | |
|--------------|--------------|-----|---|--|--|
| 212A | А | 1 | 212 | Paper insert | |
| 213A | А | 1 | 213 | Paper insert | |
| 214A | А | 1 | 214 | Paper insert | |
| 217A | G | 1 | 217 Storage | | |
| 218A | Е | 1 | Stair | | |
| 219A | А | 1 | 219 | Paper insert | |
| 220A | А | 1 | 220 | Paper insert | |
| 222A | А | 1 | 222 | Paper insert | |
| 224A | А | 1 | 224 | Paper insert | |
| 225A | G | 1 | 225 Copy/Work | | |
| 226A | А | 1 | 226 | Paper insert | |
| 228A | А | 1 | 228 | Paper insert | |
| 229A | G | 1 | 229 Data | | |
| 231A | R | 1 | | Men, Women & Accessibility symbols | |
| 232A | А | 1 | 232 | Paper insert | |
| 234A | E | 1 | Stair | | |
| 235 | В | 1 | 235 Conference Room | | |
| | | 2 | IN CASE OF FIRE DO NOT USE
ELEVATOR USE STAIRS | Provide international symbol for stair and fire, Locate
interior sign adjacent elevator call button on each floor.
Provide minimum 7"x10" sign size. | |

SIGNAGE TYPE DRAWINGS FOLLOW

Accord Series Overall Sign Size: 5.9" x 8.75" I.D. Size: 150mm x 8" *(5.98")* Mounting: VT

End Clips: Part Code: SBEC150-R (Radius) Color: A44 Architectural Brown

Sign Insert(s): Part Code: SB080-A (ADA) Size: 60mm x 8" (2.36" x 8") Photopolymer Color: A43 Putty

ADA Graphics: Copy: HelveticaNeue-Roman (HR) Size: 3/4" Color: A44 Architectural Brown (Braille Color: Same as backgrd.)

Silk-screened Graphics: Logo: LTBD (Chatham County) Size: 1 3/4" Color: TBD (70%)? A44 Architectural Brown

Part Code: SB90IS Size: 90mm x 8" *(3.54" x 8")* Part Color: A44 Architectural Brown

Part Code: SWMS90 Size: 90mm x 8" *(3.54" x 8")* Paper Color: A72 Bone White

Laser Printed Graphics: Copy: HelveticaNeue-Roman (HR) Size: 3/4" Color: Black Laser Printed



Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.



Accord Series Overall Sign Size: 5.90" x 9.25"

I.D. Size: 150mm x 8 1/2" (5.90" x 8.5") Mounting: VT

End Clips: Part Code: SBEC210-R (Radius) Color: A44 Architectural Brown

Sign Insert(s): Part Code: SB080-A (ADA) Size: 60mm x 8 1/2" (2.36" x 8.5") Photopolymer Color: A43 Putty

ADA Graphics: Copy: HelveticaNeue-Roman (HR) Size: 1" Color: A44 Architectural Brown (Braille Color: Same as backgrd.)

Silk-screened Graphics: Logo: LTBD (Chatham County) Size: 1 3/4" Color: TBD (70%)? A44 Architectural Brown

Part Code: SB60 Size: 60mm x 8 1/2" (2.36" x 8.5") Part Color: A43 Putty

Silk-screened Graphics: Copy: HelveticaNeue-Roman (HR) Size: 5/8" Color: A44 Architectural Brown

Part Code: SBSB / SBSI (Slider) Size: 30mm x 8 1/2" / 4 1/4" (1.18" x 8.5"/4.25") Part Color: AColor: A44 Architectural Brown Vinyl Color: 25-43 Putty

Silk-screened Graphics: Copy: HelveticaNeue-Roman (HR) Size: 3/8" Color: A44 Architectural Brown

Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.



Status: **Production Info:** Sign Type: © All Design Rights Reserved **Corporate Headquarters** Chatham County Project: B Work Order #: TBD **APCO** 388 Grant Street SE Human Resources Office Atlanta. GA 30312-2227 Approved By: - Lott + Barber **Conference Room ID** Ph: 404.688.9000, Fax: 404.577.3847 Approved Date: Sales Rep: Valerie Walker apcosigns.com Email: sales@apcosigns.com Customer approval is required prior to 1/2" = 1" CSR/PM: Scale:

Accord 15 Series

Overall Sign Size: 3.54" x 9.25" I.D. Size: 90mm x 8 1/2" (3.54" x 8.5") Mounting: Vinyl Tape

End Clips: Part Code: SBEC90-R (Radius) Part Color: A44 Architectural Brown

Sign Insert(s): Part Code: SB080-A (ADA) Size: 90mm x 8 1/2" (3.54" x 8.5") Photopolymer Color: A43 Putty

ADA Graphics: Copy: HelveticaNeue Roman (HR) Size: 5/8" Color: A44 Architectural Brown (Braille Color: Same as backgrd.)

Silk-screened Graphics: Logo: LTBD (Chatham County) Size: 1 1/2" Color: TBD (70%)? A44 Architectural Brown



Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.



Project Reference: Status: Production Info: Sign Type: **Corporate Headquarters** Chatham County Project: G Work Order #: TBD **APCO** 388 Grant Street SE Human Resources Office Atlanta, GA 30312-2227 Approved By: - Lott + Barber General Room ID Ph: 404.688.9000, Fax: 404.577.3847 Approved Date: Accord 15 Series Sales Rep: Valerie Walker apcosigns.com Email: sales@apcosigns.com CSR/PM: Customer approval is required prior to production. Scale: 1/2'' = 1''

Acrylic Plaque Series Mounting: Vinyl Tape (VT)

Plaque:

Part Code: 341A-A (ADA) I.D. Size: 8" x 9" Photopolymer Color: A43 Putty

ADA Graphics:

Copy: HelveticaNeue Roman (HR) Size: 3/4", 2" & 5/8" Color: A44 Architectural Brown (Braille Color: Same as backgrd.)

STAIR B STAIR S STAIR

Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.

Scale Test

| | | Project Reference: | | Status: | Date: | Drawn By: | Production Info: | Sign Type: |
|-----------------|---|-----------------------|---|---------|----------------|-----------------------|--|-------------------------|
| APCO | Corporate Headquarters
388 Grant Street SE
Atlanta, GA 30312-2227
Db: 404 600 6000 Form 404 677 2047 | Project:
Customer: | Chatham County
Human Resources Office
- Lott + Barber | | | | Work Order #: TBD
Approved By: | F
Exterior sign type |
| apcosigns com | Fmail: sales@ancosigns.com | Sales Rep: | Sales Rep: Valerie Walker | | Approved Date: | Acrylic Plaque Series | | |
| aptionghiolocim | Entrin. Jaios Supersigns.com | CSR/PM: | | | | | Customer approval is required prior to production. | Scale: 1/2" = 1" |

Accord 15 Series Overall Sign Size: 8.26" x 6.75" I.D. Size: 210mm x 6" (8.26" x 6") Mounting: Vinyl Tape

End Clips: Part Code: SBEC210-R (Radius) Part Color: A44 Architectural Brown

Sign Insert(s): Part Code: SB150A Size: 150mm x 6" *(5.90" x 6")* Part Color: A43 Putty

Silk-Screened Graphics: Symbol: S60 (Men/Accessible) Size: 3" Color: A44 Architectural Brown

Symbol (*Alternate Layout*): S59 (Women/Accessible) Size: 3" Color: A44 Architectural Brown

Part Code: SB080A-A (ADA) Size: 60mm x 6" *(2.36" x 6")* Photopolymer Color: A44 Architectural Brown

ADA Graphics: Copy: HelveticaNeue-Roman (HR) Size: 5/8" Color: A43 Putty (Braille Color: Same as backgrd.)





Alternate Layout Scale: 1/4" = 1"

Scale Test

1/2" 3/4"

1/4"

Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.



Accord 15 Series

Overall Sign Size: 8.26" x 6.75" I.D. Size: 210mm x 6" *(8.26" x 6")* Mounting: Vinyl Tape

End Clips: Part Code: SBEC210-R (Radius) Part Color: A44 Architectural Brown

Sign Insert(s):

Part Code: SB150A Size: 150mm x 6" *(5.90" x 6")* Part Color: A43 Putty

Silk-Screened Graphics: Symbol: S60 (Men/Accessible) Size: 4" Color: A44 Architectural Brown

Part Code: SB080A-A (ADA) Size: 60mm x 6" *(2.36" x 6")* Photopolymer Color: A44 Architectural Brown

ADA Graphics:

Copy: HelveticaNeue-Roman (HR) Size: 5/8" Color: A43 Putty (Braille Color: Same as backgrd.)



Colors depicted are a general representation of the color specified. If color selection is critical, please request sample for approval.

Production Info: Project Reference: Status: Date: Sign Type: **Corporate Headquarters** Chatham County Project: Ε Work Order #: TBD APCO 388 Grant Street SE Human Resources Office Atlanta, GA 30312-2227 Approved By: - Lott + Barber Exit Stair ID Ph: 404.688.9000, Fax: 404.577.3847 Approved Date: Accord 15 Series Valerie Walker apcosigns.com Email: sales@apcosigns.com Sales Rep: Customer approval is required prior to production. Scale: 1/2'' = 1''CSR/PM:

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SECTION 102233 - ACCORDION FOLDING PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

SUMMARY 1.2

Section includes manually operated, accordion folding partitions. A.

B. **Related Sections:**

- 1.
- Division 01 Section "Alternates" for description of alternate affecting this product. Division 06 Section "Rough Carpentry" for supports that attach supporting tracks to overhead 2. structural system.
- 3. Division 09 Section "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.

DEFINITIONS 1.3

- A. NIC: Noise Isolation Class.
- Β. NRC: Noise Reduction Coefficient.
- C. STC: Sound Transmission Class.

1.4 PERFORMANCE REQUIREMENTS

- Acoustical Performance: Provide accordion folding partitions tested by a qualified testing agency for the А. following acoustical properties according to test methods indicated:
 - Sound-Transmission Requirements: Accordion folding partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated 1. for not less than the STC indicated.
 - Noise-Reduction Requirements: Accordion folding partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated. 2.
 - Acoustical Performance Requirements: Installed accordion folding partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and 3. rated for 10 dB less than STC value indicated

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- Β. LEED Submittals:
 - Laboratory Test Reports for Credit IEQ 4.1: For adhesives products, documentation indicating that 1. products comply VOC limits.
- Shop Drawings: Include plans, elevations, sections, details, numbered panel installation sequence, and C. attachments to other work.
 - Indicate storage and operating clearances. Indicate location and installation requirements for hardware 1. and track, blocking, and direction of travel.
- D. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing indicated.
 - 1. Include similar Samples of accessories involving color selection.
- Samples for Verification: For each type of exposed material, finish, covering, or facing indicated, prepared E. on Samples of size indicated below:
 - Textile: Full width by not less than 36-inch-long section of fabric from dye lot to be used for the 1. Work, with specified treatments applied. Show complete pattern repeat.
 - 2. Panel Edge Material: Not less than 3 inches long.
 - 3. Hardware: Manufacturer's standard exposed door-operating device.

1.6 INFORMATIONAL SUBMITTALS

- A. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each operable panel partition.
- C. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For accordion folding partitions to include in maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - 2. Seals, hardware, track, carriers, and other operating components.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Fire-Test-Response Characteristics: Provide panels with finishes meeting one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: 26 to 75
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of accordion folding partition openings by field measurements before fabrication.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of accordion folding partitions that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal wear.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Frame/panels: Steel sheet, 24 gage, V-groove, nominal minimum thickness for uncoated steel.

B. Adhesives: Manufacturer's standard products that comply with the testing and product requirements of LEED IEQ 4.1 Credit.

2.2 ACCORDION OPERABLE ACOUSTICAL PANELS

- A. Accordion Folding Partitions: Accordion folding partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hufcor.
 - b. KWIK-WALL Company.
 - c. Modernfold, Inc.; a DOŘMA Group Company. (Model Soundmaster #12 is Basis of design) d. Panelfold Inc.
- B. Partition Operation: Manually operated, top supported, accordion folding.
- C. Panel Construction: Shall consist of steel hinge plates welded to 3/16-inch (5mm) diameter vertical steel rods, with a single row of plates at the bottom and top with intermediate rows at approximately 42-inch on center. Partitions 10'-0" high or over have a double row of hinge plates at the top. A high tensile alloy steel trolley yoke, functioning as a hinge pin at required intervals, supports the frame assembly. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - 1. Panel Width: Standard widths.
- E. STC: Not less than 40.
- F. Panel Weight: 5 lb/sq. ft. maximum.
- G. Stack Thickness: Not greater than 13 inches .
- H. Panel Closure: Manufacturer's standard to receive acoustical panel ceiling assembly.
- I. Hardware: Grip type hand pulls shall be die cast zinc, satin chrome finish, extruded aluminum.
- 2.3 SEALS
 - A. General: Provide types of seals indicated that produce operable panel partitions complying with acoustical performance requirements and the following:
 - 1. Shall be pairs of three-layer flexible sweep strips at top and bottom. Vertical female sound channel shall be polyurethane foam lined.
 - Pairs of Flexible Sweep Strips: Shall be provided at top and bottom of the partition. Air release for air trapped within the folding partition shall be accomplished during operation by a series of 3/8-inch (9.5mm) diameter holes through the lead post molding.
 - 3. Partition Trim: Exposed sweep strips of one consistent color (Smoke Gray or Dark Bronze).

2.4 FINISH FACING

- A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to accordion folding partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
 - 1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, and with invisible seams complying with Shop Drawings for location, and with no gaps or overlaps. Horizontal butted edges seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
 - 2. Where facings with directional or repeating patterns or directional weave directional, repeating, or matching grain are indicated, mark facing top and attach facing in same direction.
 - 3. Match facing pattern 72 inches above finished floor.
 - 4. Color/Pattern: As selected by Architect from manufacturer's full range.
- B. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.

- Total Weight: 27 oz Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts. 1. 2.

2.5 SUSPENSION SYSTEMS

- Suspension Tracks: Suspension System, track and trolley sizes matched to the size of the partition. A.
 - Suspension Tracks: Shall be of a continuous "C" channel shaped track, connected to the structural 1. support.
- Carriers: The accordion folding partition shall be suspended from the track by two-wheel intermediate and Β. four-wheel lead trolley assemblies.
- C. Aluminum Finish: Mill finish for unexposed metal and manufacturer's standard, factory-applied, decorative finish for metal exposed to view.
- Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise D. indicated.

ACCESSORIES 2.6

- Jamb-Lock: Backpost to be secured to the wall by the "Jamb-Lock" mechanism concealed within the backpost A. to provide a quick means of releasing and reattaching the partition for cleaning and decorative purposes.
- Β. Locks: Satin chrome handpulls with (select) manufacturer's standard locks or master-keyed locks.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine flooring, structural support, and opening, with Installer present, for compliance with requirements A. for installation tolerances and other conditions affecting performance of accordion folding partitions.
- Proceed with installation only after unsatisfactory conditions have been corrected. Β.

3.2 INSTALLATION

- A. General: Comply with accordion folding partition manufacturer's written installation instructions.
- Β. Install accordion folding partitions and accessories after other finishing operations, including painting, have been completed.
- C. Install partitions from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched partitions are not acceptable.
- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 ADJUSTING

- Adjust accordion folding partitions to operate smoothly, without warping or binding. Lubricate hardware and A. other moving parts.
- Adjust storage pocket doors to operate smoothly and easily, without binding or warping. Check and readjust Β. operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.4 CLEANING

Clean soiled surfaces of accordion folding partitions to remove dust, loose fibers, fingerprints, adhesives, and Α. other foreign materials according to manufacturer's written instructions.

DEMONSTRATION 3.5

Demonstrate proper operation and maintenance procedures to Owner's representative. A.

END OF SECTION 102226

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Public-use washroom accessories.
- 2. Public-use shower room accessories.
- 3. Private-use bathroom accessories.
- 4. Custodial accessories.

B. Related Sections:

1. Section 088300 "Mirrors" for frameless mirrors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.
- C. LEED Submittals:
 - 1. Product Data for Credit MR4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Data for Credit MR5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- B. Toilet Tissue (Roll) Dispenser 102800.A:
 - 1. Basis-of-Design Product: Bobrick; B-2730
 - 2. Description: Single-roll dispenser.
 - 3. Mounting: Surface mounted.
 - 4. Operation: Noncontrol delivery with theft-resistant spindle.
 - 5. Capacity: Designed for 5-inch- diameter tissue rolls.
 - 6. Material and Finish: Satin-finish aluminum bracket with plastic spindle.
- C. Paper Towel (Folded) Dispenser 102800.D:
 - 1. Basis-of-Design Product: Bobrick; B-2620
 - 2. Mounting: Surface mounted.
 - 3. Minimum Capacity: 400 C-fold multifold towels.
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 5. Lockset: Tumbler type.
 - 6. Refill Indicators: Pierced slots at sides or front.
- D. Grab Bar 102800.C:
 - 1. Basis-of-Design Product: Bobrick; series 5806
 - 2. Mounting: Flanges with concealed fasteners.
 - 3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
 - 4. Outside Diameter: 1-1/2 inches.
 - 5. Configuration and Length: As indicated on Drawings Straight, 36 inches and 42 inches long.

2.3 PRIVATE-USE BATHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- B. Robe Hook 102800.F:
 - 1. Basis-of-Design Product: Bobrick; B-672
 - 2. Description: contoured 4" wide bar forms hook at each end
 - 3. Material and Finish: Polished chrome-plated brass
- C. Towel Bar 102800.B:
 - 1. Basis-of-Design Product: Bobrick; B-7673
 - 2. Description: 3/4-inch- round tube with circular end brackets
 - 3. Mounting: Flanges with concealed fasteners.
 - 4. Length: 24 inches.
 - 5. Material and Finish: Stainless steel, No. 4 finish (satin).

2.4 CUSTODIAL ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
- B. Mop and Broom Holder 102800.E:
 - 1. Basis-of-Design Product: Bobrick; B-224x36
 - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
 - 3. Length: 36 inches.
 - 4. Hooks: Three
 - 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
 - b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. 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. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Fire protection cabinets for the following:
 - 1. Portable fire extinguishers.
- B. Related Sections: Division 10 Section "Fire Extinguishers."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- D. LEED Submittals:
 - 1. Product Data for Credit MR4: Product data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating cost for each product having recycled content.
 - 2. Product Data for Credit MR5: Product data for regional materials indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 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.

1.6 SEQUENCING

A. Apply decals vinyl lettering on field-painted, fire protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:

8/15/11

- 1. Sheet: ASTM B 209.
- 2. Extruded Shapes: ASTM B 221.
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 3 6 mm thick, with Finish 1 (smooth or polished).

2.2 FIRE PROTECTION CABINET 104413.A

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Manufacturer's: Subject to compliance with requirements, provide products by one of the following:
 - a. Fire End & Croker Corporation
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc.
 - d. Larsen's Manufacturing Company
 - e. Modern Metal Products, Division of Technico Inc.
 - f. Moon-American..
 - g. Potter Roemer LLC.
 - h. Watrous Division, American Specialties, Inc.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.
- D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - 1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo panel with frame Center glass panel with frame.
- H. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting lever handle with cam-action latch.
 - 2. Provide concealed hinge permitting door to open 180 degrees.
- J. Accessories:
 - 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - 2. Lettered Door Handle: One-piece, aluminum door handle.
 - 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER"
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Silk-screened.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.

FIRE EXTINGUISHER CABINETS

K. Finishes:

- 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door trim, door, and trim except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
- 2. Aluminum: Clear anodic.
- 3. Steel: Baked enamel or powder coat.
- 4. Stainless Steel: No.4

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
 - 3. Prepare doors and frames to receive locks.
 - 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.6 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling"
- B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: Select from standard color offerings from manufacturer.

2.7 STAINLESS-STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

- 1. Run grain of directional finishes with long dimension of each piece.
- 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- 3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below:
 - 1. Fire Protection Cabinets: 48 inches above finished floor to center of door handle.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
 - 2. Provide inside latch and lock for break-glass panels.
 - 3. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

CHATHAM COUNTY OGLETHORPE HUMAN RESOURCES OFFICE (2012-10) SAVANNAH, GEORGIA

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections:
 - 1. Division 10 Section "Fire Extinguisher Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers.'
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Final Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet and mounting bracket indicated.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.

 - Amerex Corporation. Ansul Incorporated; Tyco International Ltd. Badger Fire Protection; a Kidde company. b.
 - c.
 - d.
 - e. f.
 - Buckeye Fire Equipment Company. Fire End & Croker Corporation. J. L. Industries, Inc.; a division of Activar Construction Products Group. Kidde Residential and Commercial Division; Subsidiary of Kidde plc. Larsen's Manufacturing Company.
 - g. h.

 - Moon-American. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc. 1.
 - j. k.
 - Potter Roemer LLC. Pyro-Chem; Tyco Safety Products.
 - Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging. 2.
- B. Multipurpose Dry-Chemical Type in Steel Container 104416.A: UL-rated 4-A:60-B:C,5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following: 1.
 - a.
 - b.
 - c.
 - d.
 - Amerex Corporation. Ansul Incorporated; Tyco International Ltd. Badger Fire Protection; a Kidde company. Buckeye Fire Equipment Company. Fire End & Croker Corporation. J. L. Industries, Inc.; a division of Activar Construction Products Group. e. f.
 - Larsen's Manufacturing Company. Potter Roemer LLC.
 - g. h.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals 1. applied to mounting surface.
 - a. Orientation: Vertical

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 48 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 113100 - RESIDENTIAL APPLIANCES

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. Refrigeration appliances.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.
- B. LEED Submittals:
 - 1. Product Data for: For appliances indicated, documentation that products are ENERGY STAR rated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of appliance, from manufacturer.
- B. Warranties: Sample of special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain each type of residential appliance from single manufacturer.
- C. Regulatory Requirements: Comply with the following:
 - 1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.7 WARRANTY

- A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period. except as qualified below:
 - 1. Warranty Period: One year from date of Substantial Completion.

- B. Refrigerator Icemaker, Sealed System: Full warranty including parts and labor Limited warranty including parts and labor for first year and parts thereafter for on-site service on the product.
 - 1. Warranty Period for Sealed Refrigeration System: One year from date of Substantial Completion.
 - 2. Warranty Period for Other Components: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 REFRIGERATOR/FREEZERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - 1. Amana; a division of Whirlpool Corporation.
 - 2. BOSCH Home Appliances.
 - 3. Electrolux Home Products (Frigidaire).
 - 4. General Electric Company (GE).
 - 5. General Electric Company (Hotpoint).
 - 6. KitchenAid; a division of Whirlpool Corporation.
 - 7. Sears Brands LLC (Kenmore).
 - 8. Sub-Zero, Inc.
 - 9. Viking Range Corporation.
 - 10. Whirlpool Corporation.
- B. Side-By-Side Refrigerator/Freezer 113100.B: Two-door refrigerator/freezer.
 - 1. Basis-of-Design Product: GE Model #GSH25JGDBB
 - 2. Type: Side-By-Side, with water & ice dispenser in door
 - 3. Dimensions:
 - a. Width: 35-3/4 inches.
 - b. Depth: 33-5/8 inches
 - c. Height: 69 3/4 inches
 - 4. Storage Capacity:
 - a. Refrigeration Compartment Volume: 15.5 cu. ft.
 - b. Freezer Compartment Volume: 9.75 cu. ft.
 - c. Total Storage Capacity: 25.25 cu. ft.
 - d. Shelf Area: Four adjustable chrome wire shelves
 - 5. General Features:
 - a. Door Configuration: Side-by-side
 - b. Touch pad digital temperature control
 - c. Dispenser in freezer door dispensing cubed ice, crushed ice and water.
 - d. Factory water filtration
 - e. Defrost type: Factory defrost
 - f. ADA Compliant
 - g. Interior lighting within both compartments
 - 6. Refrigerator Features:
 - a. Compartment Storage Refrigerator:
 - 1) 4 shelves, (2 adjustable)

- 2) 4 door shelves, (2 adjustable)
- 3) Minimum 2 stack drawer system
- b. Compartment Storage Freezer:
 - 1) 5 total door shelves
 - 2) 1 storage bin
- 7. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
- 8. Front Panel(s): Porcelain enamel.
 - a. Panel Color: Black, textured
- 9. Appliance Color/Finish sides & top: Black, textured
- 10. Power Ratings: 120v; 60Hz; 15A

2.2 ICEMAKERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - 1. KitchenAid; a division of Whirlpool Corporation.
 - 2. Sears Brands LLC (Kenmore).
 - 3. Sub-Zero, Inc.
 - 4. Viking Range Corporation.
 - 5. Whirlpool Corporation.
- B. Undercounter Icemaker 113100.A:
 - 1. Basis-of-Design Product: U-Line, model ADA151M
 - 2. Type: Undercounter
 - 3. Dimensions:
 - a. Width: 15 inches
 - b. Depth: 23-3/16 inches
 - c. Height: 32 inches
 - 4. Ice Capacity:
 - a. Production: 25 per day.
 - b. Storage: 25 lb
 - 5. Features:
 - a. Door Configuration: Overlay.
 - b. Manual defrost
 - c. Automatic shutoff.
 - d. Defrost drain with pump.
 - e. Ice cube size: $\frac{1}{2}$ " w x 3/4"h x 2 $\frac{1}{2}$ " L
 - f. Reversible Door
 - g. Fits ADA Counter heights of 34" AFF.
 - 6. Front Panel: Porcelain enamel
 - a. Panel Color: Black

7. Appliance Color/Finish: Black

2.3 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Comply with manufacturer's written instructions.
- 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. Utilities: Comply with plumbing and electrical requirements.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain residential appliances.

END OF SECTION 113100

SECTION 142600 - LIMITED-USE/LIMITED-APPLICATION ELEVATORS

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 limited-use/limited-application (LU/LA) elevators.
- B. Related Requirements:
 - 1. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
 - 2. Section 051200 "Structural Steel Framing" for attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - 3. Section 055000 "Metal Fabrications" for requirements related to elevator pit ladder, elevator door sill support and elevator hoist beam.
 - 4. Section 096816 "Sheet Carpeting" for finish flooring in elevator cars.

C. DEFINITIONS

- D. Definitions in ASME A17.1/CSA B44 apply to Work of this Section.
- E. LU/LA: Limited use/limited application.

1.3 ACTION SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include Product Data for car enclosures, hoistway entrances, and operation, control, and signal equipment.
- B. Shop Drawings:
 - 1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Indicate loads imposed on building structure at points of support and power requirements.
- C. Samples for Initial Selection: For finishes involving color selection.
- D. Samples for Verification: For exposed car finishes, hoistway doors, and frames; 3-inch- square Samples.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.

- 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- C. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator being provided.
- D. Preinstallation Examination Report: Indicating dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
- E. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction, for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Provide a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

- A. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of other work relating to LU/LA elevators including sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Schumacher Elevator Company, 1400 Series Limited Use Limited Access Elevator or comparable product by one of the following:
 - 1. American Crescent Elevator Mfg., Corp.
 - 2. Cemcolift, Inc.
 - 3. Federal Elevator Inc.
 - 4. Liftavator, Inc.
 - 5. National Wheel-O-Vator; a division of ThyssenKrupp Access.
 - 6. Nationwide Lifts, Inc.
 - 7. Savaria Concord Lifts.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with Section 408 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI7-05 and shall comply with elevator safety requirements in ASME A17.1/CSA B44.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
 - 2. Refer to design parameters on structural drawings for additional seismic requirements.
 - 3. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 4. Design earthquake spectral response acceleration short period (Sds) for Project is 1.
 - 5. Project's Seismic Design Category: C.
 - 6. Elevator Component Importance Factor: 1.0.

2.3 SYSTEMS AND COMPONENTS

- A. Elevator System, General: Manufacturer's standard LU/LA elevator. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard LU/LA elevators and as required for complete system.
 - 1. Rated Load: 1400 lb.

- 2. Rated Speed: 30 fpm.
- B. Machine Type: Hydraulic, holeless, beside the car; direct-acting hydraulic or roped hydraulic.
- C. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
 - 1. Pump shall be submersible type, with submersible squirrel-cage induction motor, suspended inside oil tank from vibration isolation mounts.
 - 2. Motor shall have solid-state starting.
 - 3. System shall have hydraulic silencer and flexible piping connectors at pump unit.
- D. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.
- E. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

2.4 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system for selective-collective automatic operation.
- B. Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its car and hoistway doors, and shuts down. System includes rechargeable battery and automatic recharging system.
- C. Emergency Operation: None required

2.5 DOOR REOPENING DEVICES

A. Infrared Array: Provide door-reopening devices with a uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

2.6 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with wall panels, car roof, access doors, power door operators, and ventilation. Provide finished car including materials and finishes specified below.
- B. Clear Inside Dimensions:
 - 1. Inside Width: 42 inches from sidewall to sidewall.
 - 2. Inside Depth: 60 inches from back wall to front wall (return panels).
 - 3. Inside Height: 84 inches to underside of ceiling.
- C. Materials and Finishes: Manufacturer's standards, but not less than the following:
 - 1. Floor Finish: Specified in Section 096816 "Sheet Carpeting.
 - 2. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to manufacturer's standard core with plastic-laminate panel backing and manufacturer's standard protective edge trim. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range.
 - 3. Sills: Extruded aluminum, with grooved surface, 1/4 inch thick.
- 4. Metal Ceiling: Flush panels, fabricated from cold-rolled steel sheet. Provide panels with factory-applied enamel or powder-coat finish; colors as selected by Architect from manufacturer's full range.
- 5. Lighting: Not less than two incandescent downlights. Provide battery backup power source with automatic charging.
- 6. Handrail: 1/2 by 2 inches rectangular satin stainless steel, No. 4 finish, on one side of car.
- D. Car Doors: Manufacturer's standard units complete with track systems, hardware, sills, and accessories.
 - 1. Operation: Power-operated, automatic.
 - 2. Type: Horizontal sliding.
 - 3. Clear Opening Width: 36 inches.
 - 4. Door Height: 80 inches.
 - 5. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel or powder-coat finish; colors as selected by Architect from manufacturer's full range.

2.7 HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard door-and-frame hoistway entrances, same size as car doors, complete with track systems, hardware, sills, and accessories.
 - 1. Operation: Power-operated, automatic.
 - 2. Type: Horizontal sliding.
- B. Coordinate frame size and profile with hoistway wall construction.
 - 1. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 - 1. Enameled-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
 - 2. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
 - 3. Sills: Extruded aluminum, with grooved surface, 1/4 inch thick.
 - 4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.
- D. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as-close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 - 1. Fire-Protection Rating: 1 hour with 30-minute temperature rise of 450 deg F.

2.8 SIGNAL EQUIPMENT

A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life lamps and acrylic or other permanent, non-yellowing translucent plastic diffusers or LEDs.

- 1. Finish: Satin stainless steel, No. 4 finish.
- B. Car-Control Stations: Provide manufacturer's standard car-control stations. Mount in side panel adjacent to car door unless otherwise indicated.
 - 1. Mark buttons and switches for function. Use both tactile symbols and Braille.
 - 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. Car Position Indicator: Provide digital-type position indicator in elevator car. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- E. Hall Push-Button Stations: Provide manufacturer's standard wall-mounted units, equipped with buttons for calling elevator and for indicating desired direction of travel where applicable.
- F. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings.
- G. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - 1. At manufacturer's option, audible signals may be placed on each car.
- H. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.9 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- E. Stainless-Steel Bars: ASTM A 276, Type 304.
- F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- G. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- H. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install cylinder plumb and accurately located for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.
- B. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise from elevator system.
- C. Lubricate operating parts of systems as recommended by manufacturers.
- D. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Reduce clearances to minimum, safe, workable dimension at each landing.
- E. Leveling Tolerance: 1/4 inch, up or down, regardless of load and direction of travel.
- F. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- G. Locate hall lanterns either above or beside hoistway entrance at a minimum of 72 inches above finished floor unless hall lanterns are built into entrance frames.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use, perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by authorities having jurisdiction.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed.

3.4 DEMONSTRATION

A. Check operation of elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.5 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 6 months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance during normal working hours.
 - 2. Perform emergency callback service during normal working hours with response time of two hours or less.
 - 3. Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

SECTION 144200 - WHEELCHAIR LIFTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Inclined platform lifts.
- B. Related Requirements:
 - 1. Division 26 Electrical specifications for power infrastructure requirements.

1.3 DEFINITIONS

A. Definitions in ASME A18.1 apply to Work of this Section.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components, and finishes for lifts.
 - 2. Include rated capacities, operating characteristics, electrical characteristics, safety features, controls, finishes, and accessories.
- B. Shop Drawings: For each lift.
 - 1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
 - 2. Indicate dimensions, weights, loads, and points of load to building structure.
 - 3. Include details of equipment assemblies, method of field assembly, components, and location and size of each field connection.
 - 4. Include diagrams for power, signal, and control wiring.
- C. Samples for Initial Selection: For surfaces and components with factory-applied color finishes.
 - 1. Include Samples of integrally colored materials and accessories involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Metal Finish: Manufacturer's standard-size unit, not less than 3 inches square.
 - 2. Tubular Products and Running Trim: Manufacturer's standard-size unit, 6 inches long.
 - 3. Hardware: Manufacturer's standard, exposed, door-operating device.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of lift.
 - 1. Include statement that runway, ramp or pit, dimensions as shown on Drawings, and electrical service as shown and specified are adequate for lift being provided.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.

- 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - a. Parts list with sources indicated.
 - b. Recommended parts inventory list.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
 - A. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.
 - B. Regulatory Requirements: Comply with ASME A18.1, "Safety Standard for Platform Lifts and Stairway Chairlifts."
- 2.2 INCLINED PLATFORM LIFT (144200.A)
 - A. Inclined Platform Lift, General: Preengineered lift system.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Garaventa Lift "Xpress II" or comparable product by one of the following:
 - a. Butler Dynamics, LLC.
 - b. Savaria Concord Lifts
 - c. ThyssenKrupp Access.
 - B. Number of Stops: Two.
 - C. Platform Size: 31 by 49 inches (must be ADA compliant)
 - D. Rated Speed: 20 fpm.
 - E. Power Supply: 208 V, 60 Hz, single phase.
 - F. Emergency Operation: Provide manual operation and battery power system to raise or lower units in case of malfunction or power loss.
 - G. Attendant Operation: Provide attendant call device at each landing.
 - H. Platform: Steel sheet or galvanized-steel sheet with manufacturer's standard black rubber flooring.
 - I. Automatic Folding Platforms: When not in use, platforms shall automatically fold up against wall to minimize projection into stairway.

- J. Platform Guarding: Guard platform with passenger-restraining arms.
 - 1. Passenger-Restraining Arms: Steel Galvanized-steel Stainless-steel tubing, power operated.
- K. Ramp: Retractable ramp matching platform to provide transition from floor to lift platform. Ramp lowers to floor automatically when lifts reach landing and enclosure door opens. Ramp rises automatically when lift control is activated for lift to leave landing.
 - 1. Ramp Size: End ramps a minimum of <u>32 inches</u> length as required for slope.
 - 2. Ramp Slope: Maximum 1:12.
 - 3. Ramp Finish: Finish ramps to match lift platform.
- L. Support to Structure: Provide framing and support within wall to support loads imposed by wall-mounted guide rails. Fabricate framing/brackets in wall as indicated on drawings. Exposed steel support towers are not allowed.
- M. Guide Rails: Fabricate from aluminum extrusions. Upper rail houses the rack that the platform's pinion gear utilizes for travel which the platform is mechanical attached to. Lower rail is used as guide track.
- N. Accessories: Provide units with the following accessories:
 - 1. Fold-down seat with seatbelt.
 - 2. Caution sign as required by ASME A18.1.
 - 3. Audio visual alert consisting of a wall mounted strobe light and audible chime cautions pedestrians in the vicinity that the lift is in operation. Volume of chime to be adjustable.

2.3 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500/A 500M.
- C. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by loads.
- D. Steel Sheet: ASTM A 1008/A 1008M, cold-rolled commercial steel (CS) or ASTM A 1011/A 1011M hot-rolled, commercial steel (CS); as required for each use.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, G90 zinc coating,
- F. Galvanizing: Hot-dip galvanize items complying with the following:
 - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- G. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; manufacturer's standard strengths and thicknesses for type of use.
 - 1. Extruded Aluminum: ASTM B 221.
 - 2. Aluminum Sheet and Plate: ASTM B 209.
- H. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- I. Stainless-Steel Tubing: ASTM A 554, Grade MT-304.
- J. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
- K. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing structural members, guide rails, machines, and other lift components where installation of devices is specified in another Section.
- L. Expansion Anchors: Anchor-bolt-and-sleeve assembly of material indicated below with capability to sustain a load equal to 10 times the load imposed as determined by testing according to ASTM E 488 conducted by a qualified independent testing agency.

- 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
- 2. Material: Group 1, Alloy 304 or Alloy 316, stainless-steel bolts and nuts complying with ASTM F 593 and ASTM F 594.
- M. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 FINISHES

- A. Steel, aluminum and Galvanized-Steel Factory Finish:
 - 1. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 - 2. Color and Gloss: As selected by Architect from manufacturer's full range
- B. Aluminum Finishes:
 - 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected by Architect from manufacturer's full range.
- C. Fiberglass Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, critical dimensions, and other conditions affecting performance of the Work.
- B. Minimum Headroom Clearance: Verify that installed lift will have a minimum headroom of 80 inches above any point on platform floor at any point of travel.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASME A18.1 and manufacturer's written instructions for installation of lifts unless otherwise indicated.
- B. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- C. Coordinate platform doors with platform travel and positioning.
- D. Adjust stops for accurate stopping and leveling at each landing, within required tolerances.
 - 1. Leveling Tolerance: 1/4 inch up or down, regardless of load and direction of travel.
- E. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.

- F. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
- G. Test safety devices and verify smoothness of required protective enclosures and other surfaces.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- B. Operating Test: In addition to acceptance testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

3.4 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.
- B. Check operation of lifts with Owner's personnel present and before date of Substantial Completion. Determine that operating systems and devices are functioning properly.
- C. Check operation of lifts with Owner's personnel present not more than one month before end of warranty period. Determine that operating systems and devices are functioning properly.

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SECTION 210000 - GENERAL PROVISIONS

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.
- B. Plumbing Commissioning Requirements.
- C. HVAC Commissioning Requirements.

1.2 GENERAL REQUIREMENTS

- A. General conditions, supplementary, and Special Conditions of the Contract govern work under this Section.
- B. Contractors performing work shall be totally responsible for work and shall coordinate, connect and conform to all sections or divisions of the Specifications and all drawings as required to provide complete systems.
- C. Applicable provisions of this section apply to and are hereby made part of the other sections of this Division.
- D. The Drawings and Specifications shall be understood to cover, according to their intent and meaning, complete operating systems as shown on the drawings and specified under appropriate sections of the specifications. The Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed and furnished as though mentioned in both specifications and drawings.
- E. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided for such system.
- F. Verification of Existing Conditions: No allowance shall be made for failure to investigate site before building.
- G. Coordinate all utility construction and service installation with respective utility.
- H. The Contractor shall remove and/or relocate existing equipment and devices as required to provide clearance for new construction and to render system operational in existing spaces.
- I. Contractor has the responsibility to assist the Commissioning Agent in performance of building systems commissioning.

1.3 CODES AND STANDARDS

- A. International Fire Protection Code, 2006 Edition with Georgia Amendments.
- B. International Fuel Gas Code, 2006 Edition with Georgia Amendments.
- C. International Building Code, 2006 Edition with Georgia Amendments.
- D. International Plumbing Code, 2006 Edition with Georgia Amendments.
- E. International Mechanical Code, 2006 Edition with Georgia Amendments.
- F. National Electric Code 2011 Edition with Georgia Amendments.
- G. NFPA 72E Automatic Fire Detectors with Georgia Amendments.
- H. NFPA 90A Installation of Air Conditioning and Ventilating Systems with Georgia Amendments.
- I. NFPA 101 Life Safety Code- 2000 Edition with Georgia Amendments with Georgia Amendments.

- A. LAYOUT OF WORK: Drawings are Diagrammatic. Correlate final equipment locations with governing Architectural and Structural drawings and existing conditions. Lay out work before installation so that all trades may install equipment in spaces available. Provide coordination as required for installation in a neat and workmanlike manner. Verify working clearances and install per code.
- B. COORDINATION: Provide all required coordination and supervision where work connects to or is affected by work of the sections of the Specification and comply with all requirements effecting the Division. Work required under other Divisions, Specifications, or Drawings to be performed by this Division shall be coordinated with the Division.
- C. SUPERVISION OF WORK: Provide a field superintendent who has had previous successful experience on projects of comparable size and complexity. Superintendent shall be present at all times that work is being performed.
- D. INSPECTIONS: All work must pass routine and final inspections by local and state agencies.
- E. Suitably protect all materials and equipment and items furnished under this Contract during construction. Restore all damaged surfaces and items to "like new" condition before a request for final acceptance.
- F. SCHEDULING: Contractor scheduling is to be coordinated with the Owner and Architect.
- G. CLEANLINESS CONTROL AND CLEAN-UP: Provide dust partitions, vacuum systems or exhaust fan to control dust and debris during construction operations. Procedures shall prevent dust and debris from entering finished areas. The Contractor shall also be responsible for removal of trash on a daily basis and shall maintain the construction area free of stored materials. If the Contractor is negligent in this regard, the area will be cleared in accordance with the terms of the General Conditions.
- H. CUTTING AND PATCHING: Locate all openings required for work required under this Section. Cut openings with minimum over-cut, place sleeves or other closure system as required and patch all areas about the cut zone to match existing finishes. Openings in concrete shall be locked out before placement of concrete. Core boring or saw cutting only on approval of Architect.
- I. COMMISSIONING
 - 1. Contractor has the responsibility to assist the project Commissioning Agent (CxA) in performance of building systems commissioning. See related Section 220800 Plumbing Commissioning Requirements and Section 230800 HVAC Commissioning Requirements.
- 1.5 SUBSTITUTIONS: Comply with pertinent provisions of the Instructions to Bidders.

1.6 SUBMITTALS

- A. Comply with pertinent provisions of the General Conditions.
- B. Product Data: Within 30 calendar days after the Contractor has received the Owner's Notice to Proceed, Submit:
 - 1. Materials list of items proposed to be provided under this section.
 - 2. Manufacturer's specifications and other data needed to prove compliance with the specified requirements (NOTE: Generic or class data covering more than one piece of equipment or options shall be marked to show application for this specific project.
 - 3. Manufacturer's recommended installation procedures which, when approved, will become the basis

for accepting or rejecting actual installation procedures used on the Work.

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- 4. Format: Compile information into an adequately sized hard-cover, three-ring binder for 8-1/2" x 11" sheet. Provide correct designation on outside cover and on end of brochures, and an index to contents. Organize the material in an orderly manner and provide reinforced sheets tabbed with the appropriate specification reference number followed by the submittal for that portion of the specification.
- 5. The following items require submittal data:
- C. Shop Drawings

1. Furnish one reproducible and three prints (no more) of shop and installation drawings. The reproducible will be marked with corrections (if any) and returned to the vendor through channels. Prints may be made from the reproducible for distribution. For all drawings requiring correction, after corrections have been made by vendor, submit one reproducible and three prints. The reproducible will be marked with the appropriate review stamp and returned to vendor. The vendor shall issue prints for field use from final review reproducible. All prints use on the job shall bear "APPROVED" or "NO EXCEPTIONS TAKEN" stamp of the Engineer and the "APPROVED" stamp of the Contractor. Furnish one reproducible and three prints of joint installation drawings showing mechanical and electrical equipment in each mechanical and electrical room. Floor plans and elevations at a minimum of 1/4" equals 1', with dimensions of equipment to meet code requirements. These drawings furnished through General Contractor and developed jointly by Mechanical and Electrical Contractors. Additional installation and construction drawings may be required by General Contractor.

| ITEM | PRODUCT
DATA | SHOP
DRAWINGS | WIRING
DIAGRAMS | OPERATION & SPARE
PARTS MAINT
MANUALS | TEST
REPORTS | WARRANTY
CERTIFICATE |
|----------------------|-----------------|------------------|--------------------|---|-----------------|-------------------------|
| PIPE & FITTINGS | Х | | | | | Х |
| VALVES | х | | | Х | | Х |
| SUPPORTS & ANCHORS | х | х | | Х | | |
| IDENTIFICATION | x | | | | | |
| VIBRATION ISOLATION | x | Х | | Х | | Х |
| PIPE INSULATION | x | | | | | Х |
| DUCT INSULATION | х | | | | | Х |
| PLUMBING | | | | | | Х |
| AIR HANDLERS | х | Х | х | Х | x | Х |
| FIRE STOPPING | Х | Х | | | | |
| EXHAUST FANS | Х | Х | | Х | | Х |
| DUCTWORK & | x | х | | | | |
| AIR INLETS & OUTLETS | x | | | | | Х |
| CONTROLS & SEO OF | | | | | | |
| TEST & BALANCE | х | | | | x | Х |
| LOUVER | Х | Х | | | | Х |
| A/C HEAT PUMP UNITS | Х | | Х | Х | | Х |

D. Submittal Requirements:

E Completion Data: At substantial completion provide three sets of:

- 1 Manufacturer's Printed Operating Instructions, Maintenance procedures and spare parts recommendations as noted in table of submittal requirements.
- 2. Submittal data provided in Items B and C above.
- F. CONTRACTOR REVIEW: Review brochure before submitting to Architect. Information on each item shall be technically complete to permit an evaluation and compliance and shall bear the Contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the Contractor and submitted for checking.
- 1.7 Record As-built Drawings: In accordance with the contract.

PART 2 GUARANTEE

- 2.1 Furnish one year written guarantee to Owner from date of substantial completion on material and workmanship.
- 2.2 Furnish extended guarantee certificate on all items where greater than one year guarantee is required.

SECTION 220700 – PLUMBING INSULATION

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 WORK INCLUDED

- A. Piping insulation
- B. Jackets and accessories

1.3 RELATED WORK

A. Painting: Painting insulation jacket.

1.4 REFERENCES

- A. ANSI/ASTM C547 Mineral Fiber Preformed Pipe Insulation.
- B. ASTM/E84 Surface Burning Characteristics of Building Materials.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in piping insulation application with three years minimum experience.
- B. Materials: Flame spread smoke developed rating of 25/50 in accordance with ASTM E84.

1.6 SUBMITTALS

- A. Submit product data under provision of Section 210000.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions under provision of Section 210000.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Armstrong
- B. Owens Corning
- C. Knauf
- D. Certain-Teed
- E. Pittsburgh-Corning
- F. Imeco
- G. Johns-Manville
- H. Substitutions: Under provision of Section 210000.

2.2 INSULATION

- A. Type A: Glass fiber insulation; ANSI/ASTM C547; C547; "k" value of 0.24 at 75°F at 24°C at noncombustible.
- B. Type G: Closed cell cellular foam; flexible, plastic; "k" value of 0.28 at 75°F fire rated.

PLUMBING INSULATION

2.3 JACKETS

- A. Interior Applications:
 - 1. Vapor Barrier Jackets: Kraft reinforced foil vapor barrier with self-sealing adhesive joints.
 - 2. PVC Jackets: One piece, pre-molded type.
 - 3. Fiberglass Jackets: Per 2.04, E.
 - 4. Aluminum Jackets: ASTM B209; 0.020" thick; smooth finish.
- B. Exterior Applications: Aluminum Jackets: ASTM B209; 0.020" thick; smooth finish.

2.4 ACCESSORIES

- A. Insulation Bands: 3/4" wide; stainless steel 0.007" thick aluminum.
- B. Metal Jacket Bands: 3/8" wide; 0.015" thick aluminum. 0.010" thick stainless steel.
- C. Insulating Cement: ANSI/ASTM C195; hydraulic setting mineral wool.
- D. Finishing Cement: ASTM C449.
- E. Fibrous Glass Cloth: Untreated, 9 oz. /sq yd weight (10x10 mesh).
- F. Adhesives: Compatible with insulation.
- G. All materials used above ceilings shall be suitable for use in return air plenums.

PART 3 EXECUTION

3.1 PREPARATION

A. Install materials after piping has been tested and approved.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Continue insulation with vapor barrier through penetrations.
- C. In exposed piping, locate insulation and cover seams in least visible locations.
- D. On insulated piping with vapor barrier, insulate fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.
- E. Insulation through rated (1 hour or 2 hour) partitions or floors shall be non-combustible and shall not derate the value of the penetration.
- F. Provide an insert, not less than 6" long, of same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2" in diameter or larger, to prevent insulation from sagging at support points.
- G. Neatly finish insulation at supports, protrusions, and interruptions.
- H. Finish:
 - 1. Domestic cold and hot water, indoor: Standard jackets, with or without vapor barrier. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass cloth and adhesive. PVC jackets may be used.
 - 2. Refrigerant cold vapor lines and A/C condensates:
 - a) Concealed: insulation as manufactured
 - b) Exposed: interior and exterior paint two coats as approved by insulation manufacturer and per painting specification.

3.3 INSULATION APPLICATION (TYPE A)

- A. Apply insulation to pipe and fittings with all joints tightly fitted. Secure with jacket lap strip and aluminum bands. Cover fittings with preformed PVC or aluminum cover.
- B. Hot water valves, unions and pumps do not require insulation.

3.4 INSULATION APPLICATION (TYPE G)

- A. Slip insulation on in tubular form where possible.
- B. Longitudinal joint shall be a factory applied pressure sensitive glue or hot glue, field applied.
- C. Butt joints shall use a hot glue application.

3.5 SCHEDULE

| INSULATION
PIPING AND
THICKNESS | SYSTEM | TYPE
SIZE | PIPE
BARRIER | VAPOR |
|---------------------------------------|----------------------|--------------|-----------------|-------|
| 3/8" or ½" | A/C Condensate Lines | G | A11 | Yes |
| 3/4" | Domestic Hot Water | A or G | A11 | No |
| 1/2" | Domestic Cold Water | A or G | A11 | Yes |

END OF SECTION 220700

10/26/12

SECTION 220800 - PLUMBING COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The Commissioning process begins at project inception (during the pre-design phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the owner's project requirements. Commissioning shall:
 - 1. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards.
 - 2. Verify and document proper performance of equipment and systems.
- B. The commissioning team is made up of the contracted commissioning agent (CxA) as well as representatives from the Owner, architect, design engineers, general contractor, sub-contractors of certain construction trades and major equipment suppliers. The lead person for each trade who will actually perform and/or supervise the work shall be the designated representative to the commissioning team. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- C. The CxA shall have the responsibility for coordinating each step of the commissioning process. The trade representatives shall perform the tasks required in each step as described in this section.
- D. All commissioning work under this contract shall conform to Section 019113 Commissioning Requirements.

1.3 SYSTEMS TO BE COMMISSIONED

- A. The following systems are to be commissioned for this project:
 - 1. Domestic Water Systems

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

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SECTION 221116 - DOMESTIC WATER PIPING

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 WORK INCLUDED

- A. Pipe and Pipe Fittings
- B. Valves
- C. Hot and Cold Domestic Water System

1.3 RELATED WORK

- A. Excavation
- B. Backfilling
- C. Trenching
- D. Painting
- E. Supports and Anchors
- F. Vibration Isolation
- G. Piping Insulation

1.4 REFERENCES

- A. ANSI/ASME B16.3 Malleable Iron Threaded Fittings Class 150 NS 300.
- B. ANSI/ASME B16.23 Cast Copper Alloy Solder Joint Drainage Fittings DWV.
- C. ANSI/ASME B16.29 Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings DWV.
- D. ANSI/ASME Sect. 9 Welding and Brazing Qualifications.
- E. ANSI/ASTM B32 Solder Metal.
- F. ANSI/ASTM D2466 Poly Vinyl Chloride (PVC) Plastic Pipe Fittings, Schedule 40.
- G. ASME Boiler and Pressure Vessel Code.
- H. ASTM A53 Pipe, Steel, Black and Hot-dipped Zinc Coated, Welded and Seamless.
- I. ASTM A74 Cast Iron Soil Pipe and Fittings.
- J. ASTM A120 Pipe, Steel. Black and Hot-dipped Zinc Coated (Galvanized), Welded and Seamless, for Ordinary Use.
- K. ASTM A232 Pipe Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperatures.
- L. ASTM B88 Seamless Copper Water Tube.
- M. ASTM B306 Copper Drainage Tube (DWV).
- N. ASTM C564 Rubber Gaskets for Cast Iron Soil Pipe Fittings.

- O. ASTM D1785 Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80, and 120.
- P. ASTM D2241 Poly Vinyl Chloride (PVC) Plastic Pipe (SDR-PR).
- Q. ASTM D2855 Making Solvent Cemented joints with Poly Vinyl Chloride) PVC Pipe Fittings.
- R. ASTM D3033 Type PSP Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.
- S. ASTM D3034 Type PSM Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings.
- T. ASTM F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- U. AWS C601 Standard Methods for the Examination of Water and Waste Water.
- V. AWWA C601 Standard Methods for the Examination of Water and Waste Water.
- W. CISPI 301 Cast Iron Soil Pipe and Fittings for Hubless Cast Iron Sanitary Systems.
- X. REFERENCES:
 - ANSI B16.18 (1984; R 1994) Cast Copper Alloy Solder Joint Pressure Fittings
 - ANSI B16.22 (1995) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
 - ICC/ANSI 1002 (2008) PMG Listing Criteria for Press Connection Fittings for Potable Water Tube and Radiant Heating Systems
 - IAPMO PS117(2005) Press Type or Plain End Rubber Gasketed with Nail Connection Copper and
Copper Alloy Fittings for Installation on Copper Tubing
 - NSF/ANSI 61 Health Effects

NSF/ANSI 61-pw Potable water systems

NSF/ANSI 61-G Annex G Lead Free designation

- 1.5 QUALITY ASSURANCE
 - A. Valves: Manufacturer's name and pressure rating marked on valve body.
 - B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.
 - C. Welders Certification: In accordance with ANSI/ASME Section 9.

1.6 SUBMITTALS

- A. Submit product data under provisions of Section 210000.
- B. Include data on pipe materials, pipe fittings, valves and accessories.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 210000.
- B. Store and protect products under provisions of Section 210000.
- C. Deliver and store materials in shipping containers with labeling in place.

PART 2 PRODUCTS

2.1 SANITARY WASTE AND VENT

- A. 2" and Larger
 - 1. Cast iron pipe: ASTM A74, service weight. Fittings: Cast iron. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.
- B. 1-1/2" and Smaller
 - 1. Copper Pipe: ASTM B306, DWV. Fittings: ANSI/ASME B16.3, cast bronze, or ANSI/ASTM B32, solder, Grade 50B.
 - 2. PVC Schedule 40 with solvent welded joints.
- C. PVC

Manufactured from PVC compound with a cell class of 12454 per ASTM D 1784 and conform with National Sanitation Foundation (NSF) standards 14 and 61. Pipe shall be iron pipe size (IPS) conforming to ASTM D 1785. Socket fittings shall conform to ASTM D 2467; threaded fittings shall conform to ASTM D 2464 or D 2467. Flanges shall be 150# type per ANSI/ASME B 16.5. Solvent cements shall conform to ASTM D 2564, primer shall conform to ASTM F 656.

D. Pipe thru rated walls and in plenums above ceilings shall be cast iron or copper.

2.2 CLEANOUTS

- A. Exterior Ground Surface Areas: Brass plug, cast iron body, nicely top and cover, scoriae cover, vandal resistant assembly, Josam 58400 Series with vandal resistant screw.
- B. Interior Floor Areas: Brass plug, cast iron body, nicely top and cover, scoriae cover, vandal resistant screw. In carpeted areas provide carpet marker and vandal resistant screw. Josam Series 58400.
- C. Interior Wall Areas: Round stainless with vandal resistant hardware. Josam 58990 Series.
- D. Provide two (2) special tools designed for removal of vandal resistant hardware. Deliver to Owner at project completion.

2.3 WATER PIPING AND FITTINGS

A. Copper Tubing: ASTM B88, Type L, hard drawn. Fittings: ANSI/ASME B16.23, cast brass, or ANSI/ASME B16.29, wrought copper. Joints: Lead free ANSI/ASTM B32, Solder, Grade 95TA, Silva rite 100 or ProPress Fittings. ProPress Fittings: Bronze or copper shall conform to the material requirements of ASME B16.18 or ASME B16.22, and conform to IAPMO PS117, ICC/ANSI 1002, and NSF/ANSI 61-G, if used in a potable water system. ProPress fittings ½-inch thru 4-inch for use with ASTM B88 copper tube type K, L, or M and ½-inch up to include 1-1/4-inch annealed copper tube. ProPress fittings shall have an EPDM sealing element and Smart Connect (SC) feature. 2-1/2-inch thru 4inch shall have a 420 stainless steel grip ring, PBT separator ring, EPDM sealing element and Smart Connect (SC) feature. Sealing elements shall be verified for the intended use.

2.4 FLANGES, UNIONS AND COUPLINGS

- A. Pipe Size 2" and under: 150 psig malleable iron unions for threaded ferrous piping; bronze unions for copper pipe, soldered joints.
- B. Pipe Size Over 2": 150 psig forged steel slip-on flange for ferrous piping; bronze flanges for copper piping; fiber reinforced neoprene gaskets; 1/16" thick preformed.

C. Dielectric Connections: Union with galvanized steel threaded end, copper solder end, water impervious isolation barrier.

2.5 ACCEPTABLE MANUFACTURERS - VALVES

- A. Crane
- B. Walworth
- C. R.P. & C.
- D. Stockham
- E. Substitutions: Under Section 23000.

2.6 GATE VALVES

A. Up to 2-1/2": Bronze, 125 lb. SWP, non-shock, screwed bonnet non-rising stem, solid wedge, meeting Federal Specification WW-V-54c, Class A, Type 1.

2.7 GLOBE VALVES

A. Up to 2-1/2": Bronze, 125 lb. SWP, non-shock, screwed bonnet non-rising stem, solid wedge, meeting Federal Specification WW-V-51d, Class A, Type 1.

2.8 BALL VALVES

A. 2" and under: Crane 930-TF 500 lb. bronze body. UL listed.

2.9 SWING CHECK VALVES

A. 125 lb. SWP, bronze disc screwed bonnet meeting Federal Specification WW-V-51d, Class A, Type IV.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Provide non-conducting dielectric connections wherever joining dissimilar metals.
- B. Route piping in orderly manner and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Provide clearance for installation of insulation and access to valves and fittings.
- G. Provide access where valves and fittings are not exposed.
- H. Slope water piping and arrange to drain at low points.

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- I. Establish elevations of buried piping outside the building to ensure not less than 1.5 ft. of cover.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare pipe, fittings, supports and accessories not pre-finished, ready for finish painting.
- L. Establish invert elevations, slopes for drainage to 1/4" per foot for under 4" pipe, 1/8" per foot for 4" and larger pipe. Maintain gradients.
- M. Excavate in accordance with Section 315000.
- N. Backfill in accordance with Section 315000.
- O. Install bell and spigot pipe with bell end upstream.
- P. Install valves with stems upright or horizontal, not inverted.
- Q. Do not use PVC piping in return air plenums.

R. EXECUTION:

ProPress bronze, or copper fittings: Pipe ends shall be cut on a right angle (square) to the pipe. Pipe ends shall be reamed and chamfered, all grease, oil or dirt shall be removed from the pipe end with a clean rag. Visually examine the fitting sealing element to insure there is no damage, and it is properly seated into the fitting. Insert pipe fully into the fitting. Make a mark with a felt tip pen on the pipe at the face of the fitting. Always examine the tube to insure it is fully inserted into the fitting prior to pressing the joint. ProPress fittings ½-inch thru 4-inch shall be joined using Ridgid ProPress Tools. 2-1/2-inch thru 4-inch ProPress copper fittings shall utilize Ridgid ProPress XLC Rings, and 2-1/2-inch thru 4-inch bronze ProPress fittings shall utilize Ridgid ProPress XL Rings. ProPress fittings shall be installed according to the most current edition of the Viega installation guidelines. Sealing elements shall be verified for the intended use. Installers shall attend a Viega ProPress installation training class.

3.3 APPLICATION

- A. Use grooved mechanical couplings and fasteners only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install gate valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- E. Install globe valves for throttling, bypass, or manual flow control services.
- F. Use PVC only pipe system for waste line distribution

3.4 SERVICE CONNECTIONS

- A. Drains: Coordinate with field conditions before commencing work. Check invert elevations required for connections, confirm inverts and ensure that these can be properly connected with slope for drainage.
- B. Water: Below raised first floor.

3.5 TESTING

A. Sanitary Sewer and Vent System: Test at 10' water column to leak free condition.

- B. Domestic Water System: Hydrostatic test at 150 psig to leak free condition.
- C. After ProPress fittings have been installed a "step test" shall be followed. Utilizing air, water, or dry nitrogen, pressurize the system not to exceed 85 psi. Walk the system and check for leaks. If you do not locate any leaks proceed to pressurize the system to the recommended pressures, not to exceed 600 psi. Should you locate a leaking joint that has not been pressed, relieve the pressure from the system, insure the tube is fully inserted into the fitting and proceed to press the fitting. Should you locate a fitting that is leaking that has been previously pressed, you can press the fitting a second time. Resume testing procedure, after the necessary repairs have been made.

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure PH of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15% of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner that 4 hours after flushing, from 10% of outlets and from water entry, and analyze in accordance with AWWA C601.
- I. Submit test report for review and approval.

SECTION 230529 - HANGERS AND SUPPORTS FOR PIPING

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 WORK INCLUDED

- A. Pipe, duct, equipment hangers, supports and associated anchors.
- B. Sleeves and seals.
- C. Flashing and sealing equipment.

1.3 RELATED WORK

- A. Section 210000
- B. Vibration Isolation
- C. Piping Insulation
- D. Duct Insulation
- E. Plumbing Piping
- F. Plumbing Specialties
- G. Plumbing Fixtures
- H. Plumbing Equipment
- I. Duct work

1.4 GALVANIZING, COATINGS AND WRAPPINGS

- A. Galvanizing:
 - 1. Hot dip process. Inside and out.
 - 2. Zinc. ASTM-B-6.

PART 2 PRODUCTS

2.1 PIPE HANGERS AND SUPPORTS

- A. Hangers for Pipe Sizes 1/2 to 1-1/2": malleable iron, adjustable swivel, split ring.
- B. Hangers for pipes 2" and larger: steel clevis style.
- C. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
- D. Wall Support for Pipe Sizes to 3": Cast iron hook.
- E. Vertical Support: Steel riser clamp.
- F. Copper Pipe Support: Carbon steel ring, adjustable copper plated.
- G. Shield for Insulated Piping 2" and Smaller: 18 gage (1.2 mm) galvanized steel shield over insulation 180 degree segments, minimum 12" (300 mm) long at pipe support.

2.2 HANGER RODS

A. Steel Hanger Rods: Threaded both ends, threaded on end, or continuous threaded.

2.3 INSERTS

A. Inserts: Malleable iron cast of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rod, lugs for attaching to forms; size inserts for threaded hanger rods.

2.4 FLASHING

- A. Metal Flashing: 20 gage galvanized steel.
- B. Lead Flashing: 4 lb./sq.ft. sheet lead for water-proofing; one lb./sq.ft. sheet lead for sound-proofing.
- C. Roof Flashing: Coordinate with roofing system.

2.5 SLEEVES AND FIRE STOPPING

- A. Sleeves for Pipes through Non-Fire-Rated Floors: Schedule 40 steel pipe.
- B. Sleeves for Pipes through Non-Fire-Rated, and 1-hour rated Walls, and Potentially Wet Floors: Schedule 40 steel pipe or 16 gage galvanized steel.
- C. Sleeves for Ductwork: Through Non-rated Walls: 16 ga. steel.
- D. Sleeves for Ductwork: Through Rated Walls: 16 ga. steel.
- E. Fire stopping systems
 - 1. Vendors Grace/IPC, 3M, GE, Pensil, Nelson, Hilti.
 - 2. Fire restrictive barrier: (PVC pipes thru 1-hour and 2-hour construction)
 - 3. Fire caulking at pipe penetrations

2.6 FABRICATION

- A. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- B. Design hangers without disengagement of supported pipe.
- C. Provide copper plated hangers and supports for copper piping. Sheet lead packing between hanger for support and piping.
- 2.7 FINISH
 - A. Prime coat concealed steel hangers and supports. Hangers and supports in crawl spaces, pipe shafts, and suspended ceiling spaces are considered concealed.
 - B. Finish paint exposed steel hangers and supports to match space where they are installed.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts and spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls, self-drilling anchors or expansion anchor on concrete surfaces, sheet metal screw in sheet metal studs; and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not use powder actuated anchors.
- E. Do not drill concrete without approval.
- F. Do not drill structural steel members without approval.

- G. Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon dead bolts with spring lock washers under all nuts.
- H. Use hangers suitable for connection to channels provided and shown on the Architectural details. See drawings for details and location.
- I. Repair fire rated construction damaged during construction to original condition in accordance with procedures described in the specific U. L. Design and/or as shown on the Architectural drawings.

3.2 PIPE HANGERS AND SUPPORTS

| A. | Support all horizontal piping as follows: | | | | |
|----|---|--------------------|-----------------|--|--|
| | PIPE SIZE | MAX HANGER SPACING | HANGER DIAMETER | | |
| | 1/2 - 1-1/4" | 6' - 6'' | 3/8" | | |
| | 1-1/2 - 2" | 10'- 0'' | 3/8" | | |
| | 2-1/2 - 3" | 10'- 0'' | 1/2" | | |
| | 4" and larger
C.I. Bell and Spigot | 10'- 0" | 5/8" | | |
| | (or No-Hub) to 4" | 5'- 0" | 1/2" | | |

- B. Install hangers to provide minimum 1/2" space between finished covering and adjacent work.
- C. Place hanger within 12" or each horizontal elbow.
- D. Use hangers with 1-1/2" minimum vertical adjustment.
- E. Support horizontal PVC pipe adjacent to each joint and fitting. Maximum 6 feet of spacing between hangers.
- F. Support vertical piping at each floor. Support vertical cast iron pipe at each floor and hub.
- G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
- H. Support riser piping independently of connected horizontal piping.

3.3 FLASHING

- A. Flash Vent and Soil pipes thru roof with factory fabricated head flashing assembly approved by roofing system vendor. (Existing)
- B. Seal floor drains and pipe penetrations through floors above grade to water tight conditions.

3.4 SLEEVES

- A. Set sleeves in position in formwork. Provide reinforcing around sleeves.
- B. Extend sleeves through floors one inch above finished floor level. Caulk sleeves full depth and provide floor plate.
- C. Where piping or ductwork penetrates floor, ceiling, or wall, close off space between pipe or duct and adjacent work with fire stopping assembly and caulk seal air tight.
- D. Install stainless steel escutcheons at finished surfaces. Use deep cup style where required to cover fittings that extend beyond face of wall.
- E. Sleeves in existing concrete shall be secured with epoxy grout. Interior/annular space shall be sealed water tight.

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SECTION 230548 - VIBRATION ISOLATION

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 WORK INCLUDED

A. Vibration Isolation

1.3 RELATED WORK

- A. Air Handling Units
- B. Exhaust Fans

1.4 REFERENCES

A. ASHRAE - Guide to Average Noise Criteria Curves.

1.5 QUALITY ASSURANCE

A. Maintain ASHRAE criteria for average noise criteria curves for all equipment at full load condition.

1.6 SUBMITTALS

- A. Submit shop drawings and product data under provisions of the General Conditions.
- B. Indicate vibration isolator locations, with static and dynamic load on each, on shop drawings and described on product data.
- C. Submit manufacturer's installation instructions under provisions of Section 210000.

1.7 CERTIFICATES

A. Submit manufacturer's certificate under provisions of Division 1, that isolators are properly installed and properly adjusted to meet or exceed specified requirements.

PART 2 PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Type 1: Rod isolator.
- B. Type 2: Open spring mount with stiff springs (horizontal stiffness equal to vertical stiffness).
- C. Type 9: Rubber waffle pads, 30 durometer, minimum 1/2" thick, maximum 1/4 " thick steel plate.
- D. Color code spring mounts.
- E. Select springs to operate at 2/3 maximum compression.

2.2 FABRICATION

A. Provide pairs of neoprene side snubbers or restraining springs where side torque or thrust may develop. VIBRATION ISOLATION 230548-1 B. Type 2 isolators installed outside of building shall have neoprene coated springs and galvanized housings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install vibration isolators for motor driven equipment.

3.2 SCHEDULE

| ISOLATED EQUIPMENT | ISOLATOR |
|-----------------------------------|----------|
| Condensing Units | Type 9 |
| Duct Mounted Fans | Type 1 |
| Air Handling Units, Suspended | Type 1 |
| Air Handling Units, Floor Mounted | Type 9 |

SECTION 230553 - IDENTIFICATION OF PIPING

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 WORK INCLUDED
 - A. Exposed pipes in equipment rooms and exterior.
 - B. Pipes concealed above ceilings.
- 1.3 APPLICABLE PUBLICATIONS: The identification of piping shall be in accordance with Mil. Std. MIL-STD-101B, except as hereinafter noted.

PART 2 PRODUCTS

- 2.1 PRESSURE SENSITIVE PIPE MARKERS: Pressure sensitive pipe markers that are a manufacturer's standard catalog product may be used. Where, in Table I, Secondary Arrow is other than black, the arrow may be black but the arrow background shall be color specified. Where the arrow is specified as black, the arrow background shall be the color of the band.
- 2.2 PRIMARY WARNING (BAND): The primary warning (band) shall be of the color listed in Table I, and the size listed in Table II.
- 2.3 SECONDARY WARNING (ARROW): The secondary warning (arrow) shall be of the color listed in Table I and size listed in Table II. The arrows shall be installed so as to indicate the direction of flow in the piping.
- 2.4 TITLES: The titles shall be printed in upper case black letters as listed in Table I. Sizes of letters shall be as listed in Table II.
- 2.5 TAGS: Where pipes are too small or not readily accessible for application of bands, a brass identification tag at least 1-1/2" in diameter with depressed black letters and numerals 1/2" high shall be securely fastened at locations specified for color bands and titles.
- 2.6 VALVES: shall be identified by a brass tag secured with a stainless steel "S" hook.

PART 3 EXECUTION

3.1 Pipes exposed or concealed in accessible pipe spaces shall be provided with color bands and titles adjacent to all valves, not more than 10-foot spacing on straight pipe runs, adjacent to changes in direction, and on both sides where pipes pass through walls or floors; so as to be clearly visible from operating positions.

TABLE I

| | Primary | Secondary | | |
|--|---------|-----------|------------|--|
| Application | Band | Arrow | Title* | |
| | | | | |
| Cold Water (Potable) | Green | Black | Cold Water | |
| Hot Water (Potable) | White | Red | Hot Water | |
| Roof Drain | Blue | Blue | Roof Drain | |
| *Or as standard with manufacturer of pressure sensitive pipe marker. | | | | |

TABLE II

| Outside Diameter | Width of | Arrow | Size of Legend |
|------------------|------------|----------------|----------------------|
| of Pipe Covering | Color Band | Length x Width | Letters and Numerals |
| (inches) | (inches)* | (inches)* | (inches)* |
| 3/4 to 1-1/4 | 8 | 1-1/2 x 1/4 | 1/2 |
| 1-1/2 to 2 | 8 | 3 x 1/2 | 3/4 |
| 3-1/2 to 6 | 12 | 9 x 1-1/2 | 1-1/4 |

*Or as standard with manufacturer of pressure sensitive pipe marker.

3.2 Valves shall be numbered by system and shown on the as-built drawings. A typed valve lists shall show valve number, location (room), system, and function, e.g. "V-1, chiller yard, chilled water, C-1 inlet."

SECTION 230593 – TESTING, ADJUSTING AND BALANCING FOR HVAC

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 WORK INCLUDED

- A. Test and adjust each piece of equipment and each system as required to assure proper balance and operation.
- B. Test and regulate ventilation and air conditioning systems to conform to the air volumes shown of the drawings.
- C. Make tests and adjustments in apparatus and ducts for securing the proper volume and face distribution of air for each grille.
- D. Where required, provide pulleys for belt drive fans at no additional cost to the Owner, and set to drive fans at the speed needed to give the indicated air flow.
- E. Where required, provide buck/boost transformers on fans with PSC motors.
- F. For each system, take the following data in tabulated form:
 - 1. Air volumes at all supply, return and exhaust outlets.
 - 2. Total CFM supplied.
 - 3. Total CFM returned.
 - 4. Filter, coil and fan differential pressure.
 - 5. Motor amperage name plate and running for all motors.
 - 6. Supply, return and coil inlet wb/db.
 - 7. Ambient temperatures wb/db.
 - 8. Refrigerant pressures suction and discharge.
 - 9. Control system interaction as required by Section 230993.
- G. Submit three sets of test reports to the Architect for approval.
- H. Eliminate noise and vibration and assure proper function of all controls, maintenance of temperature, and operation in accordance with the approved design.
- I. This work is to be coordinated with other Contractors on this project.

PART 2 MATERIALS

2.1 MATERIALS

- A. Test equipment shall be calibrated with certificate dated within 6 months prior to use.
- B. Forms shall be approved by a national air balance agency.

PART 3 EXECUTION

A. Systems shall be demonstrated in cooling (greater than 85°F) and heating (less than 40°) modes.

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SECTION 230700 -HVAC INSULATION

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 WORK INCLUDED
 - A. Ductwork Insulation
 - B. Insulation Jackets

1.3 RELATED WORK

A. Painting: Painting insulation jackets

1.4 REFERENCES

- A. ANSI/ASTM C553 Mineral Fiber Blanket and Felt Insulation.
- B. ASTM E84 Surface Burning Characteristics of Building Materials.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in ductwork insulation application with three years minimum experience.
- B. Materials: UL listed; flame spread/fuel contributed/smoke developed rating of 25/50 in accordance with ASTM E84.

1.6 SUBMITTALS

- A. Submit product data under provisions of Section 210000.
- B. Include product description, list of materials and thickness for each service, and locations.
- C. Submit manufacturer's installation instructions under provisions of Section 210000.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - INSULATION

- A. Owens-Corning
- B. Knauf
- C. Certain-Teed
- D. Substitutions: Under provisions of General Contract

2.2 MATERIALS

- A. Type A: Flexible glass fiber; ANSI/ASTM C612; commercial grade; "k" value of 0.29 at 75 degrees F; 0.002" foil scrim facing for air conditioning ducts.
- B. Type C: Duct liner flexible glass fiber; ANSI/ASTM C553; "k" value of 0.24 at 75 ° F; 1.5 lb. /cu ft minimum density; coated air side for maximum 4,000 ft/min air velocity.
- C. Adhesives: Waterproof fire-retardant type.
- D. Lagging Adhesive: Fire resistive to ASTM E84.
- E. Impale Anchors: galvanized steel, 12 gage, self-adhesive pad.
- F. Joint Tape: Glass fiber cloth, open mesh (10 x 10).
- G. Tie Wire: Annealed steel, 16 gage.

PART 3 EXECUTION

3.1 PREPARATION

- A. Install materials after ductwork has been tested and approved.
- B. Clean surfaces for adhesives.

3.2 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.
- C. Exterior Insulation (Type A) Application:
 - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive reinforced with glass fiber mesh.
 - 2. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging. Seal vapor barrier penetrations by mechanical fasteners vapor barrier adhesive. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
 - 3. Seal all seams in vapor barrier jacket with glass fiber cloth and mastic.
- D. Liner (Type C) Application:
 - 1. Adhere insulation with adhesive for 100% coverage. Secure insulation with mechanical fasteners on 15" centers maximum on top and side of ductwork with dimensions exceeding 20". Seal and smooth joints. Do not use nail-type fasteners. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
 - 2. Ductwork dimensions indicated are net inside dimensions required for air flow. Increase ductwork dimensions to allow for insulation thickness.

3.3 SCHEDULE

| INSULATION DUCTWORK | THICKNESS | TYPE |
|--------------------------------|-----------|----------|
| Supply in Unconditioned Space | 2" | Type "A" |
| Return in Unconditioned Space | 2" | Type "A' |
| Supply & Return Diffuser Boots | 2" | Type "A" |
| Supply in Conditioned Space | 1.5" | Type "A" |

SECTION 230993- AIR CONTROLS AND SEQUENCE OF OPERATION

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 WORK INCLUDED

- A. Electric/Electronic Thermostats
- B. Duct mounted smoke detectors
- C. Wire and Raceways
- 1.3 Seven split system heat pumps are presently installed in the project building. This section is included in the event that one or more of these systems' air handlers or compressor units are found to need repair or replacement or that the currently installed items and materials described in this section require repair or replacement to maintain heat pump system operation. Existing controls, items shall be replaced for all heat pump systems,

1.4 RELATED SECTIONS

- A. Raceways
- B. Wire
- C. Ductwork and Accessories
- D. Air Outlets
- E. Air Handling Equipment

1.5 SYSTEM DESCRIPTION

A. This Section defines the controls and the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified herein.

1.6 SUBMITTALS

- A. Submit under Section 230500.
- B. Submit diagrams indicating mechanical system controlled and control system components. Label with settings, adjustable range of control and limits. Include written description of control sequence.
- C. Include flow diagrams for each control system, graphically depicting control logic.
- D. Include point-to-point wiring schematic diagrams for the control system.
- E. Product Data: Include list which indicates use, operating range, total range and location for manufactured components.
 - 1. Dampers, and Operators
 - 2. Switches and Relays
 - 3. Fire Detection Thermostats (Firestats & Smoke Detectors)
 - 4. Electronic Control Components
 - 5. Control Transformers
 - 6. Time clocks

F. Submit manufacturer's installation instructions in accordance with provisions of Section 230500.

1.7 PROJECT RECORD DOCUMENTS

A. Submit documents under Section 230500.

PART 2 PRODUCTS

- 2.1 ACCEPTABLE CONTROL VENDORS
 - A. Honeywell
 - B. A/C system manufacturer where required to integrate with equipment.
 - C. Carrier
 - D. Substitutions under Section 230500.

2.2 RACEWAYS

A. As described in Division 26.

2.3 WIRE

- A. Control
 - 1. 14 AWG THWN, THW
 - 2. Minimum 300V rating on low voltage circuits.
 - 3. 600V rating on line voltage circuits.
- B. Power: See Division 26.

2.4 THERMOSTATS (A/C - HEAT PUMP SPLIT SYSTEMS)

- A. (Heat/Cool) setpoint type, set points separately adjustable
- B. Auto change over HEAT/OFF/COOL/AUTO
- C. Emergency Heat: ON/NORMAL
- D. Fan: ON/AUTO
- E. 7-day programmable with day/night program.
- F. Setpoints lockable by programming.
- G. Single button push to provide 3-hour occupied override operation.
- H. Plastic lock box cover. Design to prevent adjustment of controls with cover in place.

2.5 HVAC CONTROL PROGRAM (SPLIT SYSTEM)

- 1. Unit shall heat and cool spaces in response to the space thermostat.
 - a. Cooling shall stage ON/OFF with a 1° dead band. Multi stage cooling shall be 1°F maximum between stages.
 - b. Stage one heating shall be heat pump.
 - c. Stage two heating shall be heat strip.
 - d. Strip heat shall work only in the emergency heat mode, defrost mode or as second stage when ambient temperature is below 40°F.
 - e. Fans shall be selected to "ON" during the occupied mode and auto in unoccupied mode.
- 2. Air handler smoke detector shall be connected to a remote indicator and shall shut-down unit when alarm mode is initiated See Section 283100.

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- 3. Dead bank temperature differential between heating and cooling set point shall be minimum of 5° F.
- 4. Controls shall be capable of separate programming to enable and disable each split system for each day of the week.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that systems are ready to receive work.
- B. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Check and verify location of thermostats, and other control sensors with plans and room details before installation. Locate room thermostats 60" above finished floor.
- C. Install electrical work in accordance with Division 26.
- D. All control wiring shall be in metal raceway. Coordination and installation is the responsibility of the HVAC Contractor.
- E. After completion of installation, test and adjust and calibrate control equipment. Submit data showing set points and final adjustments of controls.

3.3 CONTRACTOR'S FIELD SERVICES

- A. Prepare and start systems under provisions of Section 230500.
- B. Provide 2 hours of field service instruction after systems are fully operational.
- C. Provide an additional 2 hours of field instructions approximately 2 months after initial instructions upon request of the Owner.

3.4 DEMONSTRATION

A. Provide systems demonstration to the Engineer.

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SECTION 232300- REFRIGERATION PIPING AND SPECIALTIES

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 WORK INCLUDES

- A. Piping
- B. Refrigerant
- C. Accessories
- 1.3 Seven split system heat pumps are presently installed in the project building. This section is included in the event that one or more of these systems' air handlers or compressor units are found to need repair or replacement or that the currently installed items and materials described in this section require repair or replacement to maintain heat pump system operation.

1.4 RELATED SECTIONS

- A. Piping Insulation
- B. Air Cooled Condensing Units
- C. Air Handling Units with Coils

1.5 REFERENCES

- A. ANSI/ARI 495 Refrigerant Liquid Receivers
- B. ANSI/ARI 710 Liquid Line Dryers
- C. ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration
- D. ANSI/ASHRAE 34 Number Designation of Refrigerants
- E. ANSI/ASME Sec 8D Boilers and Pressure Vessels Code, Rules for Construction of Pressure Vessels.
- F. ANSI/ASME Sec 9 Boilers and Pressure Vessels Code, Welding and Brazing Qualifications
- G. ANSI/ASME B16.22 Wrought Copper and Copper Alloy Solder Joint Pressure Fittings.
- H. ANSI/ASME B16.26 Cast Copper Alloy Fittings for Flared Copper Tubes.
- I. ANSI/ASME B31.5 Refrigeration Piping
- J. ANSI/ASME B31.9 Building Services Piping
- K. ANSI/ASTM B32 Solder Metal
- L. ANSI/ASTM B88 Seamless Copper Water Tube
- M. ANSI/AWS A5.8 Brazing Filler Metal
- N. ANSI/AWS D1.1 Structural Welding Code, Steel
- O. ANSI/UL 429 Electrically Operated Valves
- P. ARI 750 Thermostatic Refrigerant Expansion Valves
- Q. ARI 760 Solenoid Valves for Use with Volatile Refrigerants
- R. ASTM B280 Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
- S. MIL-I-631C (Construction at Solenoid Valve Coils)
- T. MIL-V-23450C Valves, Expansion, Thermostatic, Refrigerant 12 and Refrigerant 22

1.6 SUBMITTALS

- A. Submit shop drawings under provisions of Section 210000.
- B. Submit shop drawings indicating schematic layout of system, including equipment, critical dimensions and sizes.
- C. Submit product data under provisions of Section 210000.
- D. Submit product data indicating general assembly of specialties, including manufacturer's catalog information. REFRIGERATION PIPING AND SPECIALTIES 232300-1

- E. Submit manufacturer's installation instructions under provisions of Section 210000.
- F. Submit welders certification of compliance with ANSI/ASME Section 9.
- G. Submit design data as submittal under provision of Section 210000.
- H. Submit data indicating pipe sizing.
- I. Submit test reports under provisions of Section 210000.
- J. Submit test reports indicating results of leak test, acid test.

1.7 PROJECT RECORD DOCUMENTS

- A. Submit documents under provisions of Section 210000.
- B. Accurately record exact locations of equipment and refrigeration accessories on record drawings.

1.8 REGULATORY REQUIREMENTS

- A. Conform to ANSI/ASME B31.9.
- B. Welding Materials and Procedures: Conform to ANSI/ASME Section 9.
- C. Welders Certification: In accordance with ANSI/ASME Section 9.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 210000.
- B. Deliver and store piping and specialties in shipping containers with labeling in place.
- C. Store and protect products under provisions of Section 210000.
- D. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

PART 2 PRODUCTS

- 2.1 PIPING
 - A. Copper Tubing: Larger than 7/8" O.D. ASTM B280, Type ACR hard drawn or annealed.
 - 1. Fittings: ANSI/ASME B16.22 wrought copper.
 - 2. Joints: ANSI/ASTM B32, solder Grade 95TA. ANSI/AWS A5.8 B Cup silver braze.
 - B. Copper Tubing up to 7/8" OD: ANSI/ASTM B88, Type K, annealed.
 - 1. Fittings: ANSI/ASME B16.26 cast copper.
 - 2. Joints: Flared.
- 2.2 Refrigerant
 - A. Refrigerant: ANSI/ASHRAE 34.
- 2.3 FILTER-DRIERS
 - A. Replaceable Cartridge Type: ANSI/ARI 710, UL listed, steel shell with molded desiccant filter core, flanged cover, for maximum working pressure of 350 psi, as recommended by manufacturer.
 - B. Permanent Type: Steel shell with molded desiccant filter/drier, minimum 350 psi working pressure, solder connectors.

2.4 SOLENOID VALVES

- A. Valve: ARI 760, pilot operated, copper or brass body and internal parts, synthetic seat, stainless steel stem and plunger assembly, with flared, solder, or threaded ends; for maximum operation protector and color coded lead wires, integral junction
- B. Coil Assembly: UL Listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box.

2.5 EXPANSION VALVES

- A. Angle or Straight thru Type: ARI 750; design suitable for refrigerant, brass body, internal or external equalizer, adjustable superheat setting, replaceable inlet strainer, with replaceable capillary tube and remote sensing bulb.
- B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop at expansion valve. Select valve for maximum load at design operating pressure and minimum 10°F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.2 INSTALLATION

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and not interfere with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Provide non-conducting dielectric connections when joining dissimilar metals.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints or connected equipment.
- G. Provide clearance for installation of insulation and access to valves and fittings.
- H. Provide access to concealed valves and fittings.
- I. Prepare pipe, fittings, supports, and accessories not prefinished, ready for finish painting.
- J. Insulate piping; refer to Section 220700.
- K. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- L. Provide external equalizer piping on expansion valves with refrigerant distributor connected to evaporator.
- M. Install flexible connector at right angles to axial movement of compressor.

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- N. Fully charge completed system with refrigerant after testing.
- O. Provide electrical connection to solenoid valves. Refer to Division 26.

3.3 APPLICATION

- A. Provide line size liquid indicators in main liquid line leaving condenser, or if receiver is provided, in liquid line leaving receiver.
- B. Provide line size strainer upstream of each automatic valve. Where multiple expansion valves with integral strainers are used install single main liquid line strainer.
- C. Provide permanent filter-driers in systems utilizing hermetic compressors.
- D. Provide solenoid valves in liquid line of systems, in liquid line of single or multiple evaporator systems.
- E. Provide refrigerant charging valve connections in liquid line between receiver shut-off valve and expansion valve.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the General Contract.
- B. Test refrigeration system in accordance with ANSI/ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psig. Perform final tests at 27" vacuum and at 200 psig using electronic leak detector. Test to no leakage.

SECTION 233113- DUCTWORK AND ACCESSORIES

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 WORK INCLUDED

- A. Low Pressure Ducts
- B. Volume Dampers
- C. Air Turning Devices
- D. Flexible Duct Connections

1.3 RELATED WORK

- A. Painting: Weld priming, weather resistant, paint of coating.
- B. Supports and Anchors: Sleeves
- C. Vibration Isolation
- D. Duct Insulation
- E. Testing, Adjusting and Balancing

1.4 REFERENCES

- A. ASHRAE Handbook 1981 Fundamentals; Chapter 33 Duct Design.
- B. ASHRAE Handbook 1983 Equipment; Chapter 1 Duct
- C. ASTM A90 Weight of Coating on Zinc-Coated (galvanized) Iron or Steel Articles.
- D. ASTM A 167 Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
- E. ASTM A 525 General Requirements for Steel Sheet, Zinc-Coated (galvanized) by hot-dip process.
- F. ASTM A 527 Steel Sheet, Zinc-Coated (galvanized) by Hot-dip Process, Lock Forming Quality.
- G. ASTM Aluminum and Aluminum Alloy Sheet.
- H. NFPA 90A Installation of Air Conditioning and Ventilating Systems.
- I. SMACNA Low Pressure Duct Construction Standards.
- J. UL 33 Heat Responsive Links for Fire-Protection Service.
- K. UL 181 Factory-made Air Ducts and Connectors.
- L. UL 555 Fire Dampers and Ceiling Dampers.

1.5 DEFINITIONS

- A. Duct Sizes: Inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. Low Pressure: Three pressure classifications: 1/2" WG positive or negative static pressure and velocities less than 2,000 fpm; 1" WG positive or negative static pressure and velocities less than 2,500 fpm and 2" WG positive or negative static pressure and velocities less than 2,500 fpm.

1.6 REGULATORY REQUIREMENTS

- A. Construct ductwork to NFPA 90A and SMACNA Standards.
- 1.7 SUBMITTALS

DUCTWORK AND ACCESSORIES

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- A. Submit shop drawings and product data under provisions of Section 210000.
- B. Indicate duct fittings, particulars such as gages, sizes, welds, and configuration prior to start of work for low pressure duct.
- C. Submit samples under provisions of Section 210000.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 210000.
- B. Store and protect products under provisions of Section 210000.

PART 2 PRODUCTS

2.1 MATERIALS

- A. General: Non-Combustible or conforming to requirements for Class 1 air duct materials, or UL 181.
- B. Steel Ducts: ASTM A525 or ASTM A527 galvanized steel sheet, lock-forming quality, having zinc coating of 1.25 oz. per sq. ft. for each side in conformance with ASTM A90. Exposed ducts shall have paintable galv-i-grip finish.
- C. Insulated Flexible Ducts: Flexible duct wrapped with 1" thick flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75°F.
- D. Fasteners: Rivets, bolts or sheet metal screws.
- E. Sealant: Non-hardening, water resistant, fire resistive, compatible with mating materials; liquid used alone or with tape or heavy mastic.
- F. Hanger Rod: Steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

2.2 LOW PRESSURE DUCTWORK

- A. Fabricate and support in accordance with SMACNA Low Pressure Duct Construction Standards and ASHRAE handbooks, except as indicated. Provide duct material, gages, reinforcing, and sealing with mastic for operating pressures indicated.
- B. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration or sizes permitted except by written permission.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows are used, provide air foil turning vanes. Where acoustical lining is indicated, provide turning vanes of perforated metal with glass fiber insulation.
- D. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible. Divergence upstream of equipment shall not exceed 30 degrees; convergence downstream shall not exceed 45 degrees.

- Provide easements where low pressure ductwork conflicts with piping and structure. Where easements E. exceed 10% duct area, split into two ducts maintaining original duct area.
- F. Connect flexible metal ducts to main ducts with rolled flange, rivets and adhesive.
- G. Use crimp joints with or without bead for joining round ducts sizes 8" and smaller with crimp in direction of air flow.

2.3 VOLUME CONTROL DAMPERS

- Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated. A.
- B. Fabricate splitter dampers of material same as duct to 24" size in either direction, and two gages heavier for sizes over 24".
- C. Fabricate splitter dampers of single thickness sheet metal to streamline shape. Secure blade with continuous hinge or rod. Operate with minimum 1/4" diameter rod in self-aligning, universal joint action flanged bushing with set screw.
- D. Fabricate single blade dampers for duct sizes to 9-1/2 x 30".
- E. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- F. Except in round ductwork 12" and smaller, provide end bearings. On multiple blade dampers, provide oilimpregnated nylon or sintered bronze bearings.
- Provide locking, indicating quadrant regulators on single and multi-blade dampers. Where rod lengths G. exceed 30", provide regulator at both ends.
- H. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases or adapters.

2.4 FIRE DAMPERS

- A. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- Fabricate curtain type dampers of galvanized steel with interlocking blades. Provide stainless steel closure B. springs and latches for horizontal installations. Configure with blades out of air stream for low pressure ducts up to 12" in height.
- C. Fabricate multiple blade fire dampers with 16 gage galvanized steel frame and blades. Bearings if used shall be oil-impregnated bronze or stainless steel sleeve bearings with plated steel axles, 1/8" x 1/2 " plated steel concealed linkage, stainless steel closure spring, blade stops and lock.
- D. Fusible links, UL 33, shall separate at 160° F.

2.5 AIR TURNING DEVICES

A. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

OR

Multi-blade device with radius blades attached to pivoting frame and bracket, steel or aluminum Β. construction, with push-pull operator strap ceiling mounted rotary operator knob worm drive mechanism with 18" long removable key operator.

2.6 FLEXIBLE DUCT CONNECTIONS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards, and as indicated.
- B. UL Listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq, yd., approximately 6" wide, crimped into metal edging strip.

2.7 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA Low Pressure Duct Construction Standards and as indicated.
- B. Review locations prior to fabrication.
- C. Fabricate rigid and close-fitting doors of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ductwork, install minimum 1" thick insulation with sheet metal cover.
- D. Access doors up through 12" square may be secured with sash locks (minimum 4).
- E. Provide two hinges and two sash locks for sizes up to 18" square, three hinges and two compressions latches with outside and inside handles for sizes up to 24 x 48". Provide an additional hinge for larger sizes.
- F. Access doors with sheet metal screw fasteners are not acceptable.

2.8 DUCT TEST HOLES

- A. Cut or drill temporary test holes in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent test holes shall be factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

2.9 FLEXIBLE DUCT RUNOUTS

A. Insulated Flexible Ducts: Flexible duct wrapped with 1.5" thick flexible glass fiber insulation, enclosed by seamless aluminum pigmented plastic vapor barrier jacket; maximum 0.23 K value at 75°F.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- B Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

- C. Connect terminal units to ducts directly or with 1" maximum length of flexible duct. Do not use flexible duct to change direction.
- D. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- E. Seams in all ductwork shall be sealed with mastic for air tight installation.
- F. Seal seams in duct wrap vapor barrier with 10x10 glass mesh fabric and mastic.

3. 2 DUCTWORK APPLICATION SCHEDULE

| AIR SYSTEM | MATERIAL |
|---------------------|------------------|
| Low Pressure Supply | Galvanized Steel |
| Return and Relief | Galvanized Steel |
| General Exhaust | Galvanized Steel |
| Outside Air Intake | Galvanized Steel |

3.3 ACCESSORY INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions.
- B. Provide balancing dampers at points on low pressure supply, return and exhaust systems where branches are taken from larger ducts as required for air balancing. Use splitter dampers only where indicated.
- C. Provide fire dampers at locations indicated, where ducts and outlets pass through fire rated components. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushing and hinges.
- C. Demonstrate re-setting of fire dampers to authorities having jurisdiction and Owner's representative.
- E. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
- F. Provide flexible connections immediately adjacent to equipment in ducts associated with fans and motorized equipment.
- G. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, and elsewhere as indicated. Provide minimum 12x12 " size for hand access.
- H. Coordinate location of access doors in finished surfaces with architectural finishes.
- I. Provide duct test holes where indicated and required for testing and balancing purposes.
- J. Provide volume control dampers with accessible regulator handle.
- K. Install smoke dampers at locations indicated on the drawings and in accordance with manufacturer's UL approved installation instructions.
- L. Install smoke dampers square and free from racking with blades running horizontally.
- M. Coordinate connection of electric power source to smoke damper actuator and smoke detector.
- N. Handle smoke damper using sleeve or frame. Do not lift damper using blades, actuator, or jackshaft.

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3.4 ADJUSTING AND CLEANING

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment which may be harmed by excessive dirt with temporary filters, or bypass during cleaning.
- B. Clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excess dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

SECTION 233423 - HVAC POWER VENTILATORS

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 WORK INCLUDED
 - A. Ceiling/duct mounted exhaust fans

1.3 RELATED WORK

- A. Vibration Isolation
- B. Ductwork
- C. Duct Accessories: Backdraft Dampers

1.4 REFERENCES

- A. AMCA 99 Standards handbook.
- B. AMCA 210 Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 Method of Publishing Sound Ratings for Air Moving Devices.
- E. SMACNA Low Pressure Duct Construction Standard.
- F. ASHRAE STD 84-1991 Procedure for Testing Air-to-Air Heat Exchanger

1.5 QUALITY ASSURANCE

- A. Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMA 301, tested to AMCA 300 and bear AMCA Certified Sound Rating Seal.
- C. Fabrication: Conform to AMCA 99.

1.6 SUBMITTALS

- A. Submit product data on fans under provisions of Section 210000.
- B. Provide fan curves with specified operating point clearly plotted.
- C. Submit sound power levels for both fan inlet and outlet at rated capacity.
- D. Submit manufacturer's installation instructions under provisions of Section 210000.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Penn
- B. Cook
- C. Greenheck
- D. Acme
- E. Substitutions: Under provisions of Section 210000.

2.2 DUCT MOUNTED EXHAUST FAN

- A. Centrifugal Fan Unit: direct drive as noted with aluminum housing; square duct mounting collars backward curved fan blades, statically and dynamically balanced.
- B. Disconnect Switch: Factory wired, non -fusible, in housing for thermal overload protected motor.

C. Backdraft Damper: See louver in Section 233713

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions and in conformance with ARI 435.
- B. Install units with vibration isolators.

SECTION 233613 - AIR HANDLING UNITS

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 Seven split system heat pumps are presently installed in the project building. This section is included in the event that one or more of these systems' air handlers or compressor units are found to need repair or replacement or that the currently installed items and materials described in this section require repair or replacement to maintain heat pump system operation.

1.3 WORK INCLUDED

A. Packaged air handling units.

1.4 RELATED WORK

- A. Vibration Isolation
- B. Ductwork Insulation
- C. Air Cleaning
- D. Ductwork and Accessories
- E. Controls and Sequence of Operations
- F. Air Cooled Compressor Units

1.5 REFERENCES

- A. AMCA 99 Standards Handbook.
- B. AMCA 210 Laboratory Methods of Testing Fans for Rating Purposes.
- C. AMCA 300 Test Code for Sound Rating Air Moving Devices.
- D. AMCA 301 Method of Publishing Sound Ratings for Air Moving Devices.
- E. AMCA 500 Test Methods for Louver, Dampers and Shutters.
- F. ANSI/AFBMA 9 Load Ratings and Fatigue Life for Ball Bearings.
- G. ANSI/AFBMA 11 Load Ratings and Fatigue Life for Roller Bearings.
- H. ANSI/UL 900 Test Performance of Air Filter Units.
- I. ARI 410 Forced Circulation Air Cooling and Air Heating Coils.
- J. ARI 430 Standard for Central Station Air Handling Units.
- K. ARI 435 Standard for Application of Central Station Air Handling Units.
- L. NFPA 90A Installation of Air Conditioning and Ventilation Systems.
- M. SMACNA Low Pressure Duct Construction Standards.

1.6 QUALITY ASSURANCE

- A. Fan Performance Ratings: Conform to AMCA 210 and bear the AMCA Certified Rating Seal.
- B. Sound Ratings: AMCA 301; Tested to AMCA 300 and bear AMCA Certified Sound Rating.
- C. Fabrication: Conform to AMCA 99 and ARI 430.
- D. Filter Media: ANSI/UL 900 listed, Class I or Class II, approved by local authorities.
- E. Air Coils: Certify capacities, pressure drops, and selection procedures in accordance with ARI 410.
- F. Air Handling Units: Product of manufacturer regularly engaged in production of components who issue complete catalog data on total product.

1.7 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 15010.
- B. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
- C. Product data shall indicate dimensions, weights, capacities, ratings, fan performance, motor electrical characteristics, and gages and finishes of materials.
- D. Provide fan curves with specified operating point clearly plotted.
- E. Submit sound power levels for both fan outlet and casing radiation at rated capacity.
- F. Submit product data of filter media, filter performance data, filter assembly, and filter frames.
- G. Submit electrical requirement for power supply wiring including wiring diagrams for interlock and control wiring, clearly indicating factory-installed and field installed wiring.
- H. Submit manufacturer's installation instructions under provisions of Section 15010.
- 1.8 OPERATION AND MAINTENANCE DATA
 - A. Submit operation and maintenance data under provisions of Section 15010.
 - B. Include instructions for lubrication, filter replacement, motor and drive replacement, spare parts lists and wiring diagrams.
- 1.9 DELIVERY, STORAGE AND HANDLING
 - A. Deliver products to site under provisions of Section 15010 in factory-fabricated protective containers, with factory installed shipping skids and lifting lugs.
 - B. Store and protect products under provisions of Section 15010.
 - C. Store in clean, dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures, and finish.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not operate units for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated and fan has been test run under observation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Carrier
- B. Trane
- C. York
- D. Lennox
- E. Substitutions under Section 15010.

2.2 GENERAL

A. Fabricate draw-thru type air handling units suitable for low pressure operation.

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- B. Fabricate units with fan or fan and coil section plus accessories, including heater, filter section and cooling coil section.
- C. Factory fabricate and test air handling units of sizes, capacities and configuration as indicated and specified.
- D. Performance based on sea level conditions.

2.3 CASING

- A. Construct of 18 gage minimum galvanized steel on channel base. Fabricate channel base of welded galvanized steel or steel coated externally.
- B. Insulate casing sections with one inch thick, 1-1/2 lbs per cu ft. density, neoprene coated, glass fiber insulation, "K" value at 75°F maximum 0.26 Btu/inch/sq ft/degrees F/hr, applied to internal surface with adhesive. Insulation and adhesive: Conform to NFPA 90A.
- C. Finish casings with zinc chromate, iron oxide, or phenolic resin paint. Seal fixed joints with flexible weathertight sealer. Seal removable joints with closed-cell foam gasket.
- D. Construct drain pans from single thickness stainless steel with welded corners and closed cell foam insulation. Cross break and pitch to drain connection. Provide secondary drain pan under coil section.
 1. Units 5 tons and smaller may use one piece plastic drain pans.

2.4 FANS

- A. Forward Curved: Galvanized steel construction with inlet flange, backplate, shallow blades with inlet and tip curved forward in direction of air flow, mechanically secured to flange and backplate; steel hub swagged to backplate and keyed to shaft. Secure with set screw or taper lock hub.
- B. Housing: Heavy gage steel, spot welded for AMCA 99 designated Class I and II fans, and continuously welded for Class II, adequately braced, designed to minimize turbulence with spun inlet bell and shaped cut-off.
- C. Mount fan and motor on welded steel frames coated with zinc chromate, iron oxide, or phenolic resin paint.

2.5 MOTORS AND DRIVES

- A. Motors: Three phase, poly phase conductor type; or one-phase, variable speed "ECM" type as noted on drawings.
- B. Bearings: ANSI/AFBMA 9, L-10 life at 50,000 hours, heavy duty pillow block type, self-aligning, grease-lubricated ball bearings.
- C. Shafts: Solid hot rolled steel, ground and polished, with key-way, and protected with lubricating oil coating.
- D. Belt Drive: With adjustable motor pulley.

2.6 COILS

- A. Provide coil section with access from front and sides of coil. Headers and return bends fully contained within casing. Slide coils into casing through removable panel.
- B. Provide coils indicated for refrigerant cooling. See schedule.

2.7 ELECTRIC HEATING

A. Auxiliary electric heaters of size stages and voltage noted on the drawings. Heaters to have open Nichrome elements with auto reset, manual reset and air flow interlock and safety controls. Power contactors, stages and fuses/circuit breakers to be coordinated with control and line voltage requirements. Provide suitable openings for routing of all utility connections, terminal strips in the control compartment to allow for terminal-to-terminal connection of controls and field-installed accessories.

2.8 FILTERS

- A. Standard Air Handler
 - 1. Provide filter box of galvanized steel with filter guides, access doors from bottom, front or side as required by specific configuration.
 - 2. Provide flat high capacity arrangement with (2") deep pleated 25% filters.
 - 3. After starting and performance testing, replace filters.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Standard Air Handlers
 - 1. Install in accordance with manufacturer's instructions and in conformance with ARI 435.
 - 2. Install units on vibration isolators.
 - B. Do not operate air handler whenever any dust producing activity is occurring inside building, such as sanding drywall.

3.2 AIR HANDLING UNIT SCHEDULE - SEE DRAWINGS SCHEDULE

3.3 SERVICING EXISTING AIR HANDLERS

- A. Verify fan belt condition and tightness is adequate.
- B. Lubricate bearings.
- C. Clean all interior air conveying surfaces.
- D. Clean/repair exterior casings.
- E. Verify/repair electrical power and control wiring for proper operation.
- F. Clean electric heating coil elements.
- G. Clean evaporator coil, condensate drain pan and condensate drain piping to point of disposal.
- H. Seal casing, as required, to prevent air leaks.

SECTION 233713 – DIFFUSERS, REGISTERS AND GRILLES

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 WORK INCLUDED
 - A. Diffusers
 - B. Registers/Grilles
 - C. Louvers

1.3 RELATED WORK

- A. Painting: Painting of ductwork visible behind outlets and inlets.
- B. Cleaning

1.4 REFERENCES

- A. ADC 1062 Certification, Rating and Test Manual.
- B. AMCA 500 Test Method for Louvers, Dampers and Shutters.
- C. ANSI/NFPA 90A Installation of Air Conditioning and Ventilating Systems.
- D. ASHRAE 70 Method of Testing for Rating the Air Flow Performance of Outlets and Inlets.
- E. SMACNA Low Pressure Duct Construction Standard.

1.5 QUALITY ASSURANCE

- A. Test and rate performance of air outlets and inlets in accordance with ADC Equipment Test Code 1062 and ASHRAE 70.
- B. Test and rate performance of louvers in accordance with AMCA 500.

1.6 REGULATORY REQUIREMENTS

A. Conform to ANSI/NFPA 90A.

1.7 SUBMITTALS

- A. Submit product data under provisions of Section 210000.
- B. Provide product data for items required for this project.
- C. Submit schedule of outlets and inlets indicating type, size, location, application and noise level.
- D. Review requirements of outlets and inlets as to size, finish, and type of mounting prior to submitting product data and schedules of outlets and inlets.
- E. Submit manufacturer's installation instructions under Section 210000.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Price
- B. Titus

- C. Anemostat
- D. Air Guide
- E. Krueger
- F. Substitutions under Section 210000.

2.2 RECTANGULAR CEILING DIFFUSERS

- A. Rectangular, adjustable pattern, stamped, multi-core type diffuser to discharge air in pattern per plan with sectorizing baffles where indicated.
- B. Flange frame for gyp board ceilings and modular style trim 2' x 2' panel for T-grid ceilings.
- C. Fabricate of aluminum with baked enamel off-white finish.
- D. Provide radial, opposed blade or butterfly damper and multi-louvered equalizing grid with damper adjustable from diffuser face and diffuser to duct adapter.
- E. Design Basis: Titus TDC Series for directional flow

2.3 WALL SUPPLY REGISTERS/GRILLES

- A. Streamlined and individually adjustable double row airfoil blades to discharge air in a horizontal and vertical pattern as required.
- B. 1-1/4" margin frame with concealed mounting and gasket.
- C. Fabricate of aluminum extrusions with aluminum enamel finish.
- D. Provide integral, gang operated opposed blade dampers with removable key operator, operable thru face of device.

2.4 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

- A. Streamlined blades (38° to 45° angle) depth of which exceeds 3/4" spacing.
- B. 1-1/4" margin flanged frame with concealed screw mounting for gypsum board ceilings
- C. Modular 2 x 2 lay-in mounting panel for T-grid ceiling.
- D. Fabricate of aluminum extrusions, with baked aluminum enamel finish.

2.5 LOUVERS

- A. Design Basis: Greenheck EHH-501X, hurricane resistant, Florida Product Approved wind-driven rain louver designed to protect air intake and exhaust openings in building exterior walls. Drainable head member and horizontal blades to provide maximum resistance to wind driven rain.
- B. AMCA licensed performance data enabling designers to select and apply with confidence.
- C. Tested in accordance with the Uniform Static air Pressure Test ASTM E330/TAS-202.
- D. Qualified for wind-loads up to 200 PSF.
- 2.6 LINEAR FLOOR REGISTERS/GRILLES
 - A. Type: Streamlined blades with 0 degree deflection, 1 1/8 x ³/₄ inch on 7/16 inch center, pencil proof.
 - B. Frame: 1-1/4 inch margin with concealed mounting and gasket.
 - C. Fabrication: Aluminum extrusions with factory off-white powder finish.

D. Damper: Integral gang-operated opposed blade damper with removable key operator, operable from face.

PART 3 EXECUTION

- A. Install items in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with Architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. All diffusers shall be attached to a metal duct flange or flexible duct.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, regardless of whether dampers are specified as a part of the diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black.
- G. Insulate back side of supply air diffusers with fiberglass duct wrap with vapor barrier. Seal vapor barrier edges to diffuser. Do not seal to ceiling grid.
- H. Connect ducts to Data Center louvers used for fire suppression fluid exhaust and makeup.

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SECTION 238143 - AIR COOLED CONDENSING UNITS

PART 1 GENERAL

1.1 WORK INCLUDED

- A. Condensing unit package
- B. Charge of refrigerant and oil
- C. Controls and control connections
- D. Refrigerant piping connections
- E. Motor starters
- F. Electrical power connections

1.2 RELATED SECTIONS

- A. Flashing
- B. Motors
- C. Vibration Isolation
- D. Piping Insulation
- E. Equipment Insulation
- F. Refrigeration Piping and Specialties
- G. Air handling Units with Coils
- H. Controls and Instrumentation
- I. Equipment Wiring Systems
- 1.3 Seven split system heat pumps are presently installed in the project building. This section is included in the even that one or more of these systems' air handlers or compressor units are found to need repair or replacement or that the currently installed items and materials described in this section require repair or replacement to maintain heat pump system operation.

14 REFERENCES

- A. ANSI/ASHRAE 15 Safety Code for Mechanical Refrigeration.
- B. ANSI/ASHRAE 90A Energy Conservation in New Building Design.
- C. ANSI/NEMA MG 1 Motors and Generators.
- D. ANSI/UL 207 Refrigerant-Containing Components and Accessories, Non-Electrical.
- E. ANSI/UL 303 Refrigeration and Air-Conditioning Condensing and Air-Source Heat Pump Equipment.
- F. ANSI/UL 456 Central Cooling Air Conditioners.
- G. ARI 210/240 Unitary Air-Conditioning and Air Source Heat Pump Equipment.
- H. ARI 520 Positive Displacement Refrigerant Compressors, Compressor Units and Condensing Units.
- I. ASHRAE 14 Methods of Testing for Rating Positive Displacement Condensing Units.
- J. ARI 270 Sound Rating of Outdoor Unitary Equipment.

1.4 SUBMITTALS

A. Submit shop drawings under provisions of Section 15010.

B. Submit shop drawings indicating components, assembly, dimensions, weights and loadings, required clearances, AIR COOLED CONDENSING UNITS 238143 - 1 and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.

- C. Submit product data under provisions of Section 230500.
- D. Submit product data indicating rated capacities, weights, specialties and accessories, electrical nameplate data, and wiring diagrams.
- E. Submit design data under provisions of Section 230500.
- F. Submit design data indicating pipe and equipment sizing.
- G. Submit manufacturer's installation instructions under provisions of Section 230500.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation and maintenance data under provisions of Section 230500.
- B. Include start-up instructions, maintenance instructions, parts lists, controls and accessories data.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 230500.
- B. Store and protect products under provisions of Section 230500.
- C. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
- D. Protect units on site from physical damage. Protect coils.

1.7 WARRANTY

A. Provide five (5) year non-prorated warranty under Section 230500. Include coverage for refrigerant compressors.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Carrier
- B. Trane
- C. York
- D. Lennox
- E. Substitutions: under Section 15010.

2.2 MANUFACTURED UNITS

- A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, and screens.
- B. Construction and Ratings: In accordance with ARI 210/240. Testing shall be in accordance with ASHRAE 14.
- C. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ANSI/ASHRAE 90A, but not less than 13.0 SEER cooling and 3.7 COP at 47°F heating.
- D. Heat Rejection Capacity: See drawings: at air entering condenser at 95°F.

E. Heat Pump Capacity: See Drawings. Air entering outdoor coil at 47°F dry bulb. 238143 - 2.

F. Refrigerant: R410A.

2.3 CASING

- A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors.
- C. Provide removable access doors or panels with quick fasteners.

2.4 CONDENSER COILS

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Air test under water to 425 psig, and vacuum dehydrate. Ship with holding charge of refrigerant.
- B. Coil Guard: Expanded metal. Louvered, PVC coated steel wire.

2.5 FANS AND MOTORS

- A. Vertical discharge direct/belt driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.
- B. Weatherproof motors suitable for outdoor use, single phase permanent split capacitor or 3 phase, with permanent lubricated ball bearings and built in current and thermal overload protection.

2.6 COMPRESSORS

- A. CONSTRUCTION: Semi-hermetic or hermetic reciprocating or scroll type with heat treated forged steel or cast iron shafts, aluminum alloy connecting rods, automotive type pistons, rings to prevent gas leakage, suction and discharge valves, and sealing surface immersed in oil.
- B. MOUNTING: Statically and dynamically balanced rotating parts and mount on spring/rubber-in-shear vibration isolators. Internally isolate hermetic units on springs.
- C. LUBRICATION SYSTEM: Reversible, positive displacement oil pump with oil charging valve, oil level sigh glass, oil filter, and magnetic plug or strainer.
- D. MOTOR: Constant speed 1800/3600 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting. Furnish with starter or variable speed with drive and controls.
- E. CRANKCASE HEATER: Energize heater thermostatically and when compressor is not operating.

2.7 REFRIGERANT CIRCUIT

- A. Provide each unit with one refrigerant circuit, per compressor.
- B. Provide the following for each refrigerant circuit:
 - 1. Filter dryer.
 - 2. Liquid line sight glass and moisture indicator.
 - 3. Thermal expansion valve for maximum operating pressure.
 - 4. Insulated suction line.
 - 5. Suction and liquid line service valves and gage ports.
 - 6. Liquid line solenoid valve.

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- 7. Charging valve.
- 8. Discharge line check valve.
- 9. Compressor discharge and suction service valves (semi-hermetic compressors)
- 10. Condenser pressure relief valve.
- C. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

2.8 CONTROLS

- A. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, factory wired with single point power connection.
- B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
- C. Provide the following safety controls arranged so that operating any one will shut down machine and require manual reset:
 - 1. High discharge pressure switch manual rest for each compressor.
 - 2. Low suction pressure switch automatic reset for each compressor.
- D. Operating Controls: Adjustable delay timer to prevent compressor from short cycling.
- E. Refer to Controls Section 230993.

PART 3 EXECUTION

31 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide for connection to electrical service. Refer to Division 26.
- C. Install units on vibration isolation.
- D. Provide connection to refrigeration piping system and evaporators. Comply with ANSI/ASHRAE 15.

3.2 MANUFACTURER'S FIELD SERVICES

- A. Prepare and start systems under direction of an authorized manufacturer's representative in accordance with the provisions of Section 230500.
- B. Provide initial start-up and cooling/heating change-over during first year of operation, including routine servicing and check out on 60 day intervals.
- C. Supply initial charge of refrigerant and oil for each refrigerant circuit. Replace losses of refrigerant and oil.
- D. Inspect and test for refrigerant leaks every 60 days during the first year of operation. Provide written report of inspection.

SECTION 260500 - COMMON WORKS RESULTS FOR ELECTRICAL

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.
- B. Electrical Commissioning Requirements.

1.2 GENERAL REQUIREMENTS

- A. General Conditions and Supplementary Conditions of the Contract govern work under this Section.
- B. Contractors performing work shall be totally responsible for work and shall coordinate, connect and conform to all sections or divisions of the Specifications and all drawings as required to provide complete systems.
- C. Applicable provisions of the Section apply to and are hereby made part of the other Sections of these Specifications.
- D. The Drawings and Specifications shall be understood to cover, according to their intent and meaning, complete operating systems as shown on the drawings and specified under appropriate section of the specifications. The Drawings and Specifications are to be taken together. Work specified and not shown or work shown and not specified shall be performed or furnished as though mentioned in both Specifications and Drawings.
- E. Minor items and accessories or devices reasonably inferable as necessary to the complete and proper operation of any system shall be provided for such systems.
- F. Verification of Existing Conditions: No allowance shall be made for failure to investigate site before bidding.
- G. Coordinate all utility connections and service installation with respective utilities.
- H. Motor starters and controllers furnished as integral part of equipment are specified and furnished under applicable Equipment section and are not work of this section.
- I. Motor starters and controllers not furnished as integral part of equipment specified in applicable Mechanical sections, are to be provided as part of Electrical.
- J. Refer to Mechanical sections for control system wiring: Conduit and wire installation is part of this section.
- K. Contractor has the responsibility to assist the Commissioning Agent in performance of building systems commissioning.

1.3 CODES AND STANDARDS

- A. International Fire Code, 2006 Edition.
- B. International Building Code, 2006 Edition.
- C. International Plumbing Code, 2006 Edition.
- D. International Mechanical Code, 2006 Edition.
- E. National Electric Code 2011 Edition.
- F. NFPA 72E Automatic Fire Detectors.
- G. NFPA 90A Installation of Air Conditioning & Ventilating Systems.
- H. NFPA 101 Life Safety Code 2000 Edition
- J. Fire Alarm Code- NFPA 72

1.4 REGULATORY REQUIREMENTS

- A. Layout of Work: Drawings are diagrammatic. Correlate final equipment locations with governing Architectural and Structural drawings and existing conditions. Lay outwork before installation so that all trades may install equipment in spaces available. Provide coordination as required for installation in a neat workmanlike manner.
- B. Coordination: Provide all required coordination and supervision where work connects to or is affected by work of others, and comply with all requirements affecting this Division. Work required under other Divisions, specifications or Drawings to be performed by this Division shall be coordinated with this Division.
- C. Supervision of Work: Provide a field superintendent who has had previous successful experience on projects of comparable size and complexity. Superintendent shall be present at all times that work is being performed.
- D. Inspections: All work must pass routine and final inspections by the local building inspection authority.
- E. Suitably protect all materials and equipment and items furnished under this Contract during construction. Restore all damaged surfaces and items to "like new" condition before a request for final acceptance.
- F. Cleanliness Control and Cleanup: Provide temporary partitions vacuum systems or exhaust fans to control dust and debris during construction operations. Procedures shall prevent dust and debris from entering finished areas occupied by the Owner or tenants. The Contractor shall also be responsible to removal of trash on a daily basis and shall maintain the construction area free of stored materials. If the Contractor is negligent in this regard, the area will be cleared in accordance with the terms of the General Conditions.
- G. Cutting and Patching: Locate all openings required for work required under this Section. Cut openings with minimum over-cut, place sleeves or other closure system as required and patch all areas about the cut zone to match existing finishes. Openings in concrete shall be blocked out before placement of concrete. Core boring or saw cutting of concrete only on approval of the Architect.
- H. Contractor has the responsibility to assist the project Commissioning Agent (CxA) in performance of building systems commissioning. See related Section 260800 Electrical Commissioning Requirements.

1.5 SUBSTITUTIONS

A. Comply with pertinent provisions of the Instructions to Bidders.

1.6 SUBMITTALS

- A. Comply with pertinent provisions of the General Conditions.
- B. Product Data: Within 30 calendar days after Notice to Proceed, submit:

1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements (NOTE: Generic or class data covering more than one piece of equipment or options shall be marked to show application for this specific project).

2. Manufacturer's recommended installation procedures which, when approved, will become the basis for accepting or rejecting actual installation procedures used on the work.

3. Format: Compile information into an adequately sized hard-cover, three-ring binder for 8-1/2" x 11" sheets. Provide correct designation on outside cover and on end of brochures, and an index to contents. Organize the material in an orderly manner and provide the reinforced separation sheets tabbed with the appropriate specification referenced number followed by the submittal for that portion of the specification.

COMMON WORKS RESULTS FOR ELECTRICAL

C. Shop Drawings

1. Furnish one reproducible and three prints (no more) of shop and installation drawings. The reproducible will be marked with corrections (if any) and returned to the vendor through channels. Prints may be made from the reproducible for distribution. For all drawings requiring correction, after corrections have been made by vendor, submit one reproducible and three prints. The reproducible will be marked with the appropriate review stamp and returned to vendor. The vendor shall issue prints for field use from final review reproducible. All prints use on the job shall bear "APPROVED" or "NO EXCEPTIONS TAKEN" stamp of the Engineer and the "APPROVED" stamp of the Contractor. Furnish one reproducible and three prints of joint installation drawings showing mechanical and electrical equipment in each mechanical and electrical room. Floor plans and elevations at a minimum of 1/4" equals 1', with dimensions of equipment to meet code requirements. These drawings furnished through General Contractor and developed jointly by Mechanical and Electrical Contractors. Additional installation and construction drawings may be required by General Contractor.

| ITEMS | PRODUCT
DATA | SHOP
DRAWINGS | WIRING
DIAGRAMS | MAINTENANCE
MANUALS | TEST
REPORTS | WARRANTY |
|---------------------------------|-----------------|------------------|--------------------|------------------------|-----------------|----------|
| CONDUIT | Х | | | | | Х |
| WIRE | Х | | | | | Х |
| BOXES | Х | | | | | Х |
| WIRING
DEVICES | Х | | Х | | | Х |
| CABINETS &
ENCLOSURES | X | | | | | Х |
| SUPPORTING
DEVICES | X | | | | | Х |
| IDENTIFICATION | Х | | | | | Х |
| DISCONNECT
SWITCHES | X | | X | | | X |
| GROUNDING
DEVICES | X | | | | | Х |
| PANELBOARDS | Х | Х | Х | Х | | Х |
| LIGHTING
FIXTURES | X | | X | х | | Х |
| SURGE
PROTECTION | X | X | X | х | | X |
| FIRE ALARM
SYSTEM
DEVICES | Х | Х | Х | X | X | Х |

D. Submittal Requirements:

E. Contractor Review: Review brochures before submitting to Architect. Information for each item shall be the Contractor's approval stamp, initial of checker and date checked. Requests for payment or substitutions will not be considered until brochure has been reviewed by the Contractor and submitted for checking.

10/26/12

CHATHAM COUNTY OGLETHORPE BUILDING (2012-01) SAVANNAH, GEORGIA

1.7 AS-BUILT DRAWINGS

A. In accordance with the contract.

PART 2 PRODUCTS

- 2.1 GUARANTEE/WARRANTY
 - A. Furnish one year written guarantee to Owner from date of substantial completion on material and workmanship.
 - B. Furnish extended guarantee certificate on all items where greater than one year guarantee is required.

CHATHAM COUNTY HUMAN RESOURCES OFFICE (2012.10) Savannah, Georgia

SECTION 260519 - CONDUCTORS AND CABLE

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 WORK INCLUDED

- A. Building power wire
- B. Wiring connections and terminations

1.3 REFERENCES

- A. NEMA WC 5 Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- B. National Electric Code- 2011 with Georgia Amendments.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 260500.
- B. Submit shop drawings for modular wiring system including layout of distribution devices, branch circuit conduit and cable, circuiting arrangement, and outlet devices.
- C. Submit manufacturer's instructions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Southwire
- B. Aetna Insulated Wire
- C. Cerro Wire
- D. Substitutions under provisions of general contract

2.2 MATERIALS

- A. Thermoplastic-Insulated Building Wire: NEMA WC 5.
- B. Feeders and Branch Circuits Larger than #10 AWG: Copper stranded conductor, 600 volt insulation, THW or THHN/THWN.
- C. Feeders and Branch Circuits #10 AWG and Smaller: Copper conductor, 600 volt insulation, THW or THHN/THWN, solid conductor.
- D. Control Circuits: Copper, stranded conductor 600 volt insulation, THW or THWN.

PART 3 GENERAL WIRING METHODS

- A. Use no wire smaller than 12 AWG for power and lighting circuits, and no wire smaller than 14 AWG for control wiring.
- B. Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75'.
- C. Place an equal number of conductors for each phase of a circuit in same raceway or cable.

CHATHAM COUNTY OGLETHORPE BUILDING (2012-01) SAVANNAH, GEORGIA

- D. Splice only in junction or outlet boxes.
- E. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- F. Make conductor lengths equal for parallel circuits.

3.2 WIRING INSTALLATION IN RACEWAYS

- A. Pull all conductors into a raceway at the same time. Use UL listed wire pulling lubricant for pulling No. 4 AWG and larger wires.
- B. Install wire in raceway after interior of building has been physically protected from the weather and all mechanical work likely to injure conductors has been completed.
- C. Completely and thoroughly swab raceway system before installing conductors.

3.3 WIRING CONNECTIONS AND TERMINATIONS

- A. Splice only in accessible junction boxes.
- B. Use solderless pressure connectors with insulating covers for copper wire spices and taps, 8 AW for 10 AWG and smaller, use insulated spring wire connectors with plastic caps.
- C. Use split bolt connectors for copper wire splices and taps, 6 AWG and larger. Tape uninsulated conductors and connectors with electrical tape to 150% of the insulation value of conductor.
- D. Thoroughly clean wires before installing lugs and connectors.
- E. Make splices, taps and terminations to carry full ampacity of conductors without perceptible temperature rise.
- F. Terminate spare conductors with electrical tape.

3.4 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 16010.
- B. Inspect wire and cable for physical damage and proper connection.
- C. Torque test conductor connections and terminations to manufacturers recommended values.
- D. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
- E. Test all feeders, subfeeders, and branch feeders for insulation, and record readings on appropriate forms for "Insulation Resistance Test Record". The completed forms shall be delivered to the Architect/Engineer.

3.5 WIRE AND CABLE INSTALLATION SCHEDULE

- A. All wire shall be installed in raceways.
- 3.6 COLOR CODING WIRE

| A. | Color code wire as follows: | | |
|---------------------------------|-----------------------------|---------|-------|
| | 208 VAC, 3-Phase System | A Phase | Black |
| | - | B Phase | Red |
| | | C Phase | Blue |
| | | Neutral | White |
| All Equipment Ground Conductors | | | Green |

SECTION 260526 - GROUNDING AND BONDING

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 WORK INCLUDED
- A. Power System Grounding
- B. Communication System Grounding
- C. Electrical Equipment and Raceway Grounding and Bonding

1.3 SYSTEM DESCRIPTION

- A. Ground electrical service system neutral at service entrance equipment to metallic water service and to supplementary grounding electrodes.
- B. Provide communications system grounding conductor for telephone terminal cabinet and connect to nearest panelboard ground bus.
- C. Bond system neutral to service equipment enclosures, exposed non-current carrying metal parts of electrical equipment, metal raceway systems, grounding conductor in raceways and cables, receptacle ground connectors and plumbing systems metal piping.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Section 260500.
- B. Verify location of system grounding electrode connections, and routing of grounding electrode conductor.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Conductors: Copper, conforming to Section 260500.
- B. Ground clamps: copper or bronze.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Provide a separate, insulated equipment grounding conductor in all feeder and branch circuits. Terminate each end on a grounding lug, bus or bushing.
- B. Verify that electrical service grounding electrode conductor is connected to metal water pipe using a suitable ground clamp.
- C. Verify that a supplementary grounding electrode is connected to electrical service ground in main service equipment area.
- D. Use minimum 6 AWG copper conductor and as noted for communications service grounding conductor. Leave 5' slack conductor at terminal board.
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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

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 WORK INCLUDED
 - A. Conduit and equipment supports.
 - B. Fastening hardware.

1.3 RELATED WORK

A. Cast-in-place Concrete.

1.4 QUALITY ASSURANCE

A. Support systems shall be adequate for weight of equipment and conduit, including wiring, which they carry.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 260500.
- B. Submit manufacturer's instructions.

PART 2 PRODUCTS

- 2.1 MATERIALS
- A. Support Channel: Galvanized or painted steel.
- B. Hardware: Corrosion resistant.
- C. Clevis Hangers: For supporting rigid metal conduit; galvanized steel; with 1/2" diam. hole for round steel rod.
- D. Riser Clamps: For supporting rigid metal conduit; galvanized steel; with 2 bolts and nuts, and 4" ears.
- E. C-Clamps: Black malleable iron; 1/2" rod size.
- F. I-Beam Clamps: Black steel 1-1/4" x 3/16" stock; 3" cross bolt; flange width 2".
- G. One-hole Conduit Straps: For supporting 3/4" rigid metal conduit; galvanized steel.
- H. Two-hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel; 3/4" strap width; and 2-1/8" between center of screw holes
- I. Hexagon Nuts: For 1/2" rod size, galvanized steel.
- J. Round Steel Rod: Black steel, 3/8" diameter minimum.
- K. Offset Conduit Clamps: For supporting rigid metal conduit: black steel. HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

8/15/11

PART 3 EXECUTION

3.1 INSTALLATION

- A. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts and spring steel clips.
- B. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and walls; expansion anchors or preset inserts in solid masonry walls, self-drilling anchors or expansion anchor on concrete surfaces, sheet metal screws in sheet metal studs; and wood screws in wood construction.
- C. Do not fasten supports to piping, ductwork, mechanical equipment, or conduit.
- D. Do not drill structural members without approval.
- E. Do not use powder actuated anchors.
- F Fabricate supports from structural steel or steel channel, rigidly welded or bolted to present a neat appearance. Use hexagon head bolts with spring lock washers under all nuts.
- G. In wet locations install free standing electrical equipment on concrete pads.
- H. Install surface mounted cabinets and panelboards with minimum of four anchors. Provide 3/4" plywood or steel channel supports to stand cabinet off wall.
- I. Provide extra studs as required to mount flush mounted cabinets and panelboards in stud walls.
- J. Use hangers suitable for connection to channels provided and shown on the Architectural details.
- K. Repair fire protective coating materials damaged during construction in accordance with procedures described in the U.L. Design specified on the Architectural drawings.

SECTION 260533 – BOXES

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 WORK INCLUDED
 - A. Wall and ceiling outlet boxes.
 - B. Pull and junction boxes.

1.3 RELATED WORK

A. Cabinets and Enclosures

1.4 REFERENCES

- A. ANSI/NEMA OS-1 and OS-2: Sheet-Steel Outlet Boxes, Device Boxes, Covers and Box Supports
- B. NEMA 250 Enclosures for Electrical Equipment (1000 Volts maximum).

PART 2 PRODUCTS

2.1 OUTLET BOXES

- A. Sheet metal outlet boxes: ANSI/NEMA OS 1; one piece galvanized steel, with 1/2" male fixture studs where required.
- B. Cast Boxes: Cast feralloy, deep type, gasketed cover, threaded hubs.
- C. Cast non-metallic with gasketed cover.
- 2.2 PULL AND JUNCTION BOXES
 - A. Sheet metal Boxes: ANSI/NEMA OS 1; Galvanized steel.
 - B. Sheet metal boxes larger than 12" in any dimension: NEMA-250 Type 1 steel with screw cover.
 - C. Cast metal boxes for outdoor and wet location installations: NEMA 250; Type 4 and Type 6, flat-flanged, surface-mounted junction box, UL listed as raintight. Galvanized cast iron box and cover with ground flange, neoprene gasket, and stainless steel cover screws.

PART 3 EXECUTION

- 3.1 COORDINATION OF BOX LOCATIONS
 - A. Provide electrical boxes as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and code compliance.
 - B. Electrical box locations shown on Contract Drawings are approximate unless dimensioned.
 - C. Locate and install boxes to allow access. Where installation is inaccessible, coordinate locations and sizes of required access doors with architectural details and other trades.

3.2 BOX INSTALLATION

- A. Do not install boxes back-to-back in walls. Provide minimum 8" separation, except provide minimum 24" separation in acoustic-rated walls.
- B. Locate boxes in masonry walls to require cutting of masonry unit at bottom of one cell. Coordinate masonry cutting to achieve neat openings for boxes.
- C. Provide knockout closures for unused openings.
- D. Support boxes independently of conduit except for cast box that is connected to two rigid metal conduits, both supported within 12" of box.
- E. Use multiple-gang boxes where multiple devices are mounted together; do not use sectional boxes. Provide barriers to separate wiring of different voltage systems.
- F. Concealed Outlets: At all concealed outlets for electric lights, switches, wall receptacles, telephones, etc., standard one piece galvanized steel outlet boxes shall be provided where required. Boxes and covers shall not be less than 1/16" thick and in every instance of such form dimensions as to be adapted to its specific use and location, kind of fixtures to be used, number, size, and arrangement of conduit connecting thereto. Outlet boxes shall be provided with 3/8" fixture studs where required.
- G. Wiring Device Boxes: For switches, receptacles, thermostats, telephones, etc., installed in concrete block, gypsum or plaster walls shall be square cornered, 2-1/8" deep and set with device ring, flush with the finished wall. Boxes shall be steel 4" or 4-11/16" square cornered with tile ring device adapter.
- H. Ceiling Outlets: Ceiling Outlets shall be 4" octagon, 4" or 4-11/16" square boxes with covers as required for space for conductors and for conduit arrangement. Where lighting fixtures are hung from the outlet box, 3/8" fixture studs shall be provided. Ceiling outlet boxes shall be supported with Caddy No. 512 clips as a minimum support. See details for special support requirements. Boxes supporting chandeliers shall have structural support designed for the specific fixture load.
- I. Install boxes in walls without damaging wall insulation.
- J. Caulk around boxes in exterior and rated walls.
- K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes, and within special casework. Review placement with architectural details.

| Device: | Standard Mounting: |
|------------------------|----------------------------|
| Switch Outlet | 48" Center Line |
| Convenience Receptacle | 16" to bottom and as noted |
| Wall Bracket Lights | As directed |
| Data/Telephone Outlet | 16" to bottom and as noted |
| TV | 16" and as noted |
| Above Kitchen Counter | Coordinate with backsplash |

- L. Position outlets to locate luminaires as shown on reflected ceiling plans.
- M. In inaccessible ceiling areas, position outlets and junction boxes to be accessible through luminaire ceiling opening.
- N. Provide recessed outlet boxes in finished areas; secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
- O. Align wall-mounted outlet boxes for switches, thermostats and similar devices.

P. Provide cast outlet boxes in exterior locations exposed to the weather and wet locations.

3.3 PULL AND JUNCTION BOX INSTALLATION

- A. Locate pull boxes and junction boxes above accessible ceilings or in unfinished areas.
- B. Support pull and junction boxes independent of conduit.
- C. Support pull and junction boxes in the plenum above the accessible ceiling by screw attachment to truss chord through gypsum board.
- D. Coordinate locations with work of other Sections/Divisions of the specifications to insure working access to open face of box.

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SECTION 260535 - RACEWAYS

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 WORK INCLUDED

- A. Rigid metal conduit and fittings.
- B. Intermediate metal conduit and fittings.
- C. Electrical metallic tubing and fittings.
- D. Flexible metal conduit and fittings.
- E. Liquid-tight flexible metal conduit and fittings.
- F. Surface mounted baseboard raceway.

1.3 RELATED WORK

- A. Cutting and Patching.
- B. Trenching: Excavation and backfill for conduit and utilities on site.
- C. Cast-in-place Concrete: Protective envelope for underground conduit installations.
- D. Sheet Metal Flashing and Trim.

1.4 REFERENCES

- A. ANSI C80.1 Rigid Steel Conduit, Zinc-Coated.
- B. ANSI C80.3 Electrical Metallic Tubing, Zinc-Coated.
- C. ANSI/NEMA FB 1 Fittings and Supports for Conduit and Cable Assemblies
- D. FS WW-C-563 Electrical Metallic Tubing.
- E. FS WW-C-566 Specification for Flexible Metal Conduit.
- F. FS WW-C-581 Specification for Galvanized Rigid Conduit.
- G. TIA 569-A (1998)- Commercial Building Standard for Telecommunications Pathways and Spaces.
- H. NEEMA VE-1 (2002)- Metal Cable Tray Systems

1.5 SUBMITTALS

- A. Submit shop drawings and product data under the provisions of Section 260500.
- B. Submit shot drawings for surface raceway wiring system including layout of distribution devices, branch circuit conduit and cable, circuiting arrangement, and outlet devices.
- C. Submit manufacturer's instructions.

PART 2 PRODUCTS

2.1 INTERMEDIATE METAL CONDUIT (IMC) AND FITTINGS

- A. Conduit: Galvanized Steel.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Use fittings and conduit bodies specified above for rigid steel conduit.
- 2.2 ELECTRICAL METALLIC TUBING (EMT) AND FITTINGS
 - A. EMT: ANSI C80.3 or FS WW-C-563 galvanized tubing.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; Steel compression and set screw type.
- 2.3 FLEXIBLE METAL CONDUIT FITTINGS
 - A. Conduit: FA WW-C-566; Steel.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.
- 2.4 LIQUIDTIGHT FLEXIBLE CONDUIT AND FITTINGS
 - A. Conduit: Flexible metal conduit with PVC jacket.
 - B. Fittings and Conduit Bodies: ANSI/NEMA FB 1.

2.5 PLASTIC CONDUIT AND FITTINGS

- A. Conduit: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.
- 2.6 RIGID METAL CONDUIT AND FITTING
 - A. Rigid steel conduit: ANSI C80.1, FS WW-C-581
 - B. Fittings and conduit bodies: ANSI/NEMA FB; threaded type, material to match conduit.

2.7 CONDUIT SUPPORTS

A. Conduit Clamps, Straps and Supports: Steel or malleable iron.

2.8 SURFACE MOUNTED RACEWAY

- A. Non-metallic PVC 2- compartment system with one compartment for power wiring and one compartment for data and communication wiring.
- B. U.L. listed and have non-flammable self extinguishing characteristics.
- C. Design basis: Wiremold "Access" 5000 series, off white color.
- D. Covers shall be snap-on type.
- E. Fitting shall include internal elbow outlet boxes and end caps.
- F. Connectivity outlets and modular inserts shall be provided.

PART 3 EXECUTION

3.1 CONDUIT SIZING, ARRANGEMENT AND SUPPORT

- A. Size conduit for conductor type installed or for type THW conductors. Flexible metal sheathed cable (Type MC with ground) may be used for all concealed branch circuits rated at 20 or 30 Amps.
- B. Arrange conduit to maintain headroom and present a neat appearance.
- C. Route exposed conduit and conduit parallel and perpendicular to walls and adjacent piping.
- D. Maintain minimum 6" clearance between conduit and piping. Maintain 12" clearance between conduit and heat sources such as flues, hot pipes, and heating appliances.
- E. Arrange conduit supports to prevent distortion of alignment by wire pulling operations. Fasten conduit using galvanized straps, lay-in adjustable hangers, clevis hangers, or bolted split stamped galvanized hangers.
- F. Group conduit in parallel runs where practical and use conduit rack constructed of steel channel with conduit straps or clamps. Provide space for 25% additional conduit.
- G. Do not fasten conduit with wire or perforated pipe straps. Remove all wire used for temporary conduit support during construction, before conductors are pulled.
- H. Support conduit at a maximum of 7' on center.
- I. Support cable tray in accordance with manufacturer's instructions.

3.2 CONDUIT INSTALLATION

- A. Cut conduit square using a saw or pipe cutter; de-burr and ream cut ends.
- B. Bring conduit to the shoulder of fittings and couplings and fasten securely.
- C. Use conduit hubs or sealing locknuts for fastening conduit to cast boxes, and for fastening conduit to sheet metal boxes in damp or wet locations.
- D. Install no more than the equivalent of three 90 degree bends between boxes.
- E. Use conduit bodies to make sharp changes in direction, as around beams.
- F. Use hydraulic one-shot conduit bender or factory elbows for bends in conduit larger than 1-1/2" size.
- G. Avoid moisture traps where possible; where unavoidable, provide junction box with drain fitting at conduit low point.
- H. Use suitable conduit caps to protect installed conduit against entrance of dirt and moisture.
- I. Provide No. 12 AWG insulated conductor or suitable pull string in empty conduit, except sleeves and nipples.
- J. Install expansion joints where conduit crosses building expansion joints.
- K. Where conduit penetrates fire-rated walls and floors, provide mechanical fire-stop fittings with UL listed fire rating equal to wall or floor rating. See details on Architectural Drawings.
- L. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through RACEWAYS 260535-3

roof jack with seal fittings.

M. Maximum Size Conduit routed within Slabs above Grade: 3/4". Conduits crossing each other may not be larger than 1/2".

3.3 CONDUIT INSTALLATION SCHEDULE

- A. Raceways may be routed below floor within the building unless noted to be above slab.
- B. EMT, rigid or IMC, shall be installed for all interior locations as follows:
 - 1. Concealed in walls and above ceilings.
 - 2. Exposed in electrical rooms and mechanical rooms and above floor in basement.
- D. Exposed Outdoor Locations: Intermediate metal conduit or electrical metallic tubing.
- E. Wet Interior Locations: Intermediate metal conduit, or electrical metallic tubing.
- F. Flexible Metal Conduits:
 - 1. Non-jacketed for concealed and exposed dry locations.
 - 2. Provide liquid-tight flexible conduit for connection of motors and other electrical equipment where subject to movement and vibration, and also where connections are subject to one or more of the following conditions:
 - a. Exterior locations
 - b. Moist or humid atmosphere where condensate can be expected to accumulate
 - c. Corrosive atmosphere
 - d. Water spray
 - e. Dripping oil, grease or water

3.4 CONDUIT FITTING SCHEDULE

- A. Intermediate Metal Conduit: Threaded.
- B. Electrical Metallic Tubing:
 - 1. Wet or Damp or in Concrete: Steel compression.
 - 2. Dry: Steel compression or steel set screw.
- C. Flexible: Compression type.

3.5 SURFACE RACEWAY

- A. Install in accordance with manufacturer's instructions.
- B. Coordinate routing with placement of counter and supports.

SECTION 260553 - ELECTRICAL IDENTIFICATION

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 WORK INCLUDED
 - A. Nameplates and tape labels
 - B. Wire and cable markers
 - C. Conduit color coding

1.3 RELATED WORK

A. Painting

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Section 260500.
- B. Include schedule for nameplates and tape labels.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Nameplates: Engraved three layer laminated plastic, colors as scheduled.
- B. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.
- C. Tape plastic, self adhesive, 1" wide.

PART 3 EXECUTION

- 3.1 INSTALLATION
 - A. Degrease and clean surfaces to receive nameplates.
 - B. Install nameplates parallel to equipment lines.
 - C. Secure nameplates to equipment fronts using screws, rivets or adhesive. Secure nameplate to inside face of recessed panelboard doors in finished locations.

3.2 WIRE IDENTIFICATION

- A. Provide wire markers on each conductor in panelboard gutters, pull boxes, and at load connection. Identify with branch circuit or feeder number for power and lighting circuits, and with control wire number as indicated on schematic and interconnection diagrams, equipment manufacturer's shop drawings for control wiring.
- 3.3 NAMEPLATE ENGRAVING SCHEDULE
 - A. Provide engraved laminated plastic nameplates to identify all electrical panel boards, automatic transfer switch, disconnect switches, motor starters, transformers, HVAC compressor units, water booster equipment and circulator pumps.
 - B. Letter height: 1/4" minimum.
 - C. Color: Normal Circuit Equipment: "Black with White letters".

D. Nameplates shall be secured using a weatherproof adhesive.

3.4 CIRCUIT IDENTIFICATION

- A. All junction box covers shall be identified with a permanent felt marker stating panelboard, circuits, and loads therein (e.g., Pnl N, Cir 2,4, Ltg.).
- B. All pull and junction boxes larger than 4-11/16" installed above acoustical tile grid ceilings shall have an engraved phenolic label fastened with screws on the ceiling grid facing down and located directly below the pull or junction box. The label shall reproduce the information on the box cover as required in Paragraph 3.5 "A" above.

3.5 PANELBOARDS

- A. Provide typed directory with circuit identification and load description with room numbers. Install on interior of panelboard door.
- B. Panel I.D. shall be on interior when panel is located in a finished space.

3.6 DEVICES

- A. Provide permanent circuit identification on back of each device plate.
- B. I.D. using permanent felt tip marker.

SECTION 260800 - ELECTRICAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Commissioning is a quality-oriented process for achieving, verifying, and documenting that the performance of facilities, systems, and assemblies meet defined objectives and criteria. The Commissioning process begins at project inception (during the pre-design phase) and continues through the life of the facility. The commissioning process includes specific tasks to be conducted during each phase in order to verify that design, construction, and training meets the owner's project requirements. Commissioning shall:
 - 1. Verify that applicable equipment and systems are installed according to the contract documents, manufacturer's recommendations, and industry accepted minimum standards.
 - 2. Verify and document proper performance of equipment and systems.
- B. The commissioning team is made up of the contracted commissioning agent (CxA) as well as representatives from the Owner, architect, design engineers, general contractor, sub-contractors of certain construction trades and major equipment suppliers. The lead person for each trade who will actually perform and/or supervise the work shall be the designated representative to the commissioning team. All team members work together to fulfill their contracted responsibilities and meet the objectives of the contract documents.
- C. The CxA shall have the responsibility for coordinating each step of the commissioning process. The trade representatives shall perform the tasks required in each step as described in this section.
- D. All commissioning work under this contract shall conform to Section 019113 Commissioning Requirements.

1.3 SYSTEMS TO BE COMMISSIONED

- A. The following systems are to be commissioned for this project:
 - 1. Lighting: Automatic lighting controls

PART 2 - PART 2 – PRODUCTS (NOT USED)

PART 3 - PART 3 – EXECUTION (NOT USED)

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SECTION 262416 – PANELBOARDS

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 WORK INCLUDED

- A. Service and Distribution panelboards
- B. Lighting and appliance branch circuit panelboards
- 1.3 All panelboards are existing. If replacement becomes necessary, this section will apply to new panelboards.

1.4 RELATED WORK

- A. Contactors
- B. Supporting Devices

1.5 REFERENCES

- A. FS W-C-375 Circuit Breakers, Molded Case, Branch Circuit and Service.
- B. FS W-P-115 Power Distribution Panel.
- C. NEMA PB 1 Panelboards.
- D. NEMA PB 1.1 Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 volts or less.
- E. NEMA PB 1.2 Application Guide for Ground Fault Protective Devices for Equipment.
- 1.6 SUBMITTALS
- A. Submit shop drawings for equipment and component devices under provisions of Section 260500.
- B. Include outline and support point dimensions, voltage, main bus ampacity, integrated short circuit ampere rating, circuit breaker and fusible switch arrangement and sizes.

1.7 SPARE PARTS

A. Keys: Furnish 4 to each Owner.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - PANELBOARDS

- A. Siemens ITE
- B. General Electric
- C. Square-D
- D. Cutler-Hammer
- E. Substitutions: Under provisions of Section 260500.

2.2 MAIN AND DISTRIBUTION PANELBOARDS/SWITCHBOARDS

- A. Panelboards: NEMA PB 1; Circuit breaker type.
- B. Enclosure: NEMA PB 1; Type 1, Cabinet.

- C. Provide cabinet front with concealed trim clamps or screw cover and hinged door with flush lock. Finish in manufacturer's standard gray enamel.
- D. Provide panelboards with plated copper or aluminum bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- E. Minimum Integrated Short Circuit Rating: 42,000 amps for 120/208 volt systems.
- F. Molded Case Circuit Breakers: NEMA AB 1; provide circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Provide circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- G. Branch breakers are to be plug-in or bolt-on type.

2.3 PANELBOARDS

- A. Lighting and Appliance Branch Circuit panelboards: NEMA PB 1; circuit breaker type.
- B. Enclosure: NEMA PB; Type 1.
- C. Cabinet Size: 5" deep; 20" wide.
- D. Provide flush/surface mounted cabinet front with concealed trim clamps, concealed hinge and flush lock all keyed alike. Finish in manufacturer's standard gray enamel.
- E. Provide panelboards with tinned copper or aluminum bus, ratings as scheduled on Drawings. Provide copper ground bus in all panelboards.
- F. Minimum Integrated Short Circuit Rating: 22,000 amps.
 1. 10,000 ampers RMS symmetrical for 120/208 volt panelboards.
- G. Molded Case Circuit Breakers: 120/208Vpanelboards: NEMA AB 1; bolt-in type thermal magnetic trip circuit breakers, with common trip handle for all poles. Provide circuit breakers UL listed as Type SWD for lighting circuits. Provide UL Class A ground fault interrupter circuit breakers where scheduled on Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install panelboards plumb in conformance with NEMA PB 1.
- B. Height: 6' above finished floor to highest breaker (6'6" maximum to top of panel).
- C. Provide filler plates for unused spaces in panelboards.
- D. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.

3.2 FIELD QUALITY CONTROL

- A . Measure steady state load currents at each panelboard feeder. Should the difference at any panelboard between phases exceed 20%, rearrange circuits in the panelboard to balance the phase loads within 20%. Take care to maintain proper phasing for multi-wire branch circuits.
- B. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

SECTION 262726 - WIRING DEVICES

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 WORK INCLUDED

- A. Switches
- B. Receptacles
 - 1. Standard
 - 2. Ground Fault
- C. Device plates and box covers
- D. Occupancy Sensor Switches

1.3 REFERENCES

- A. FS W-C-596 Electrical Power, Connector, Plug, Receptacle and Cable Outlet.
- B. FS W-S-896 Switch, Toggle.
- C. NEMA WD 1 General Purpose Wiring Devices.
- D. NEMA WD 5 Specific Purpose Wiring Devices.

1.4 SUBMITTALS

- A. Submit product data under provisions of Section 260500.
- B. Provide product data showing configurations, finishes, dimensions, and manufacturer's instructions.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - WALL SWITCHES AND RECEPTACLES.

- A. General Electric
- B. Bryant
- C. Leviton
- D. Hubbell
- E. Sierra
- F. Arrow Hart
- G. Eagle
- H. Substitutions: Under provision of Section 260500

2.2 WALL SWITCHES (SPECIFICATION GRADE)

- A. Wall switches for lighting circuits and motor loads under 1/2 HP: NEMA WD 1; AC general use snap switch with toggle handle, rated 20 amperes and 120- 277 volts AC.
- B. Pilot Light Type: Lighted handle
- C. Locator Type: Lighted handle
- D. Switch Color: Ivory

2.3 RECEPTACLES (SPECIFICATION GRADE)

- A. Convenience Receptacle Configuration: NEMA WD-1. General use: NEMA Type 20R, unless noted.
- B. Locking Blade Receptacles: NEMA WD 5.
- C. Specific use receptacle Configuration: NEMA WD 1 or WD 5; Type as indicated on Drawings, black or brown plastic face.
- D. GFCI Receptacles: Duplex convenience receptacle with integral ground fault current interrupter.

WIRING DEVICES

E. Receptacle Color: Ivory

2.4 ACCEPTABLE MANUFACTURERS - WALL PLATES

- A. General Electric
- B. Bryant
- C. Leviton
- D. Hubbell
- E. Sierra
- F. TayMac
- G. Substitutions: Under Section 260500.

2.5 WALL PLATES

- A. Finished Areas: Decorative, smooth plastic color to match devices.
- B. Weatherproof Receptacles, Cover Plate: Gasketed ultraviolet-stabilized polycarbonate with hinged gasketed device cover that does not diminish integrity of weatherproofing when receptacle is in use. Minimum two stainless steel screw attachment.
- C. Unfinished Areas: Galvanized Steel.

2.6 DIMMERS

- A. Wall box style with heat sink fins and system as shown on drawings.
- B. Minimum 600 watt rating.
- C. Approved manufacturers
 - 1. Lutron
 - 2. Lightolier
 - 3. Approved equal

2.7 OCCUPANCY SENSOR SWITCHES

- A. Dual technology sensing: Passive Infrared and Ultrasonic
- B. Mounting: Ceiling surface and wall surface.
- C. PIR detection: Minimum 20 feet radial at 9 foot mounting height
- D. Housing: Medium impact injection molded ABS meeting UL 94V0
- E. Single pole rating @ 120 V: 20 amps using heavy duty switch pack.
- F Turn off timing adjustable from 10 to 30 minutes.
- G. Design Basis:
 - 1. Ceiling Mount: Cooper OMC-DT-0701-R with SP-20 MV switch pack.
 - 2. Wall Mount: Cooper OAWC-DT-120W-R with SP-20 MV switch pack
- H. Warranty period: 5 years

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install wall switches OFF position down. (3-way will vary.)
- B. . Install convenience receptacles 16" to bottom of box above finish floor, and as directed/noted. Grounding pole on top.
- C. Install specific-use receptacles at heights shown on Contract Documents.
- D. Install decorative plates on switch, receptacle, and blank outlets in finished areas, after painting is complete. DO NOT install wall plates if wall opening/cutout extends beyond the edge of the device plate at any point. Coordinate/repair wall finish to provide proper opening size.
- E. Install galvanized steel plates on outlet boxes and junction boxes in mechanical and equipment rooms.
- F. Install devices and wall plates flush and level.
- G. Set occupancy sensor time delay to 15 minutes or as directed by owner or architect.
- H. Install ceiling mounted occupancy sensors in rooms other than corridors and stairways, as shown on drawings.

WIRING DEVICES

I. Install wall mounted occupancy sensors in corridors and stairways.

3.2 TESTING

- A. Test each outlet for proper wiring sequence (line, neutral, ground).
- B. Verify each device is firmly supported from the device tabs and screws, not from the device plate.

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SECTION 265100 - INTERIOR LIGHTING

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 WORK INCLUDED

- A. Interior luminaires and accessories
- B. Exterior luminaires and accessories
- C. Lamps
- D. Ballasts

1.3 RELATED WORK

- A. Trenching: Excavation and backfill
- B. Ceilings
- C. Painting

1.4 REFERENCES

- A. ANSI C82.1 Specification for Fluorescent Lamp Ballasts.
- B. FS W-F-414 Fixture, Lighting (Fluorescent, Alternating Current, Pendant Mounting).
- D. UL 924 Emergency Lighting and Power Equipment.

1.5 SUBMITTALS

- A. Submit products data under provisions of Section 260500.
- B. Include outline drawings, lamp and ballast data, support points, weights and accessory information for each luminaire type.
- C. Submit manufacturer's installation instructions under provisions of Section 260500.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 260500.
- B. Store and protect products under provisions of Section 260500.

PART 2 PRODUCTS

- 2.1 INTERIOR LUMINAIRES AND ACCESSORIES
 - A. Fluorescent Luminaires: FS-WF-414. Surface and recessed with lenses as scheduled.
 - 1. Recessed Fixtures: Provide hinged frame with latches and trim to install in the ceiling system as installed.
 - B. Recessed compact fluorescent luminaires: Prewired type.

- C. Exit Signs: Clear face edge lit, 6" high green letters, directional arrows as indicated, universal mounting type. See Section 265200.
- D. LED-lamped luminaires. 2' x 4' lay-in troffer with LED drivers.
- E. Emergency.

2.2 EXTERIOR LUMINAIRES AND ACCESSORIES

- A. Enclosures: Complete with gaskets to form weatherproof assembly.
- B. Provide low temperature ballasts with reliable starting to 10°F.

2.3 ACCEPTABLE MANUFACTURERS - LAMPS

- A. Osram
- B. General Electric
- C. Sylvania
- D. Cree
- E. Substitutions: Under provisions of Section 260500.

2.4 LAMPS

- A. Fluorescent Lamps: (3500°K design for all fluorescent lamps
 - 1. 4' long T8 SP35, nominal 2900 lumens.
 - 2. Compact type, PL-13, nominal 900 lumens.
 - 3. Compact type, FDTT 18, nominal 1200 lumens.
 - 4. Compact type, FDTT 26, nominal 1800 lumens.
 - 5. Compact type, FTTT 32, nominal 2400 lumens.
 - 6. Compact type, FTTT 42, nominal 3200 lumens.
- B. Light Emitting Diode (LED), bin selected.
- C. Self-ballasted LED enclosed with medium, screw in base.

2.5 ACCEPTABLE MANUFACTURERS - FLUORESCENT BALLASTS

- A. Advance
- B. General Electric
- C. Universal
- D. Magnetek
- E. Substitutions: Under provisions of Section 260500.

2.6 FLUORESCENT BALLASTS

A. Electronic type, UL listed. Meets FCC regulations, Part 15J "E" rated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install lamps in luminaires and lampholders.
- B. Support surface-mounted luminaires from ceiling grid T structure; provide auxiliary support laid across top of ceiling T's, fasten using bolts, screws, rivets or approved ceiling framing member clips.

- C. Install recessed luminaires in non-accessible ceiling to permit removal from below. Use plaster frames. Install grid clips in dry ceiling systems.
- D. Support recessed fixtures in T-grid ceilings with a minimum of two wires at diagonal corners of the fixture. Wires to extend from fixture to structure above.

3.2 RELAMPING

A. Relamp luminaires which have failed lamps at completion of Work.

3.3 ADJUSTING AND CLEANING

- A. Align luminaires and clean lenses and diffusers at completion of Work. Clean paint splatters, dirt, and debris from installed luminaires.
- B. Replace all damaged fixtures and lenses.
- 3.4 LUMINAIRE SCHEDULE SEE DRAWINGS.

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SECTION 265200- EMERGENCY LIGHTING EQUIPMENT

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 WORK INCLUDED

- A. Emergency lighting units.
- B. Emergency exit signs.

1.3 REFERENCES

- A. FS W-L-305 Light Set, General Illumination (Emergency or Auxiliary).
- B. NFPA 101 Code for Safety to Life from Fire in Buildings and Structures.
- C. NEMA WD1 General Purpose Wiring Devices.

1.4 REGULATORY REQUIREMENTS

A. Conform to NFPA 101 for installation requirements.

1.5 SUBMITTALS

- A. Submit product data under provisions of Section 260500.
- B. Provide product data for emergency lighting units and exit signs.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Chloride
- B. Lithonia
- C. Dual-Lite
- D. Substitutions: under provisions of Section 260500.

2.2 INCANDESCENT EMERGENCY LIGHTING UNITS

- A. Emergency Lighting Unit: FS W-L-305; Type I, Class I, self contained unit with rechargeable storage batteries, charger and lamps.
- B. Battery: 6-volt, nickel-cadmium or lead calcium type, with 1.5 hours capacity to supply the connected lamp load.
- C. Charger: Dual-rate charger, capable of maintaining the battery in a full-charge state during normal conditions, and capable of recharging discharged battery to fully charged within 12 hours.
- D. Lamps: 8 watt minimum, quartz-halogen.
- E. Indicators: Provide lamps to indicate AC ON and CHARGING.
- F. Provide test switch to transfer unit from normal supply to battery supply.
- G. Electrical Connection: Knock-out for conduit connection.

2.3 ACCEPTABLE MANUFACTURERS - SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Lithonia
- B. Emergilite
- C. Dual-lite
- D. Substitutions Under Section 260500

2.4 SELF-CONTAINED EMERGENCY POWER EXIT SIGNS

- A. Type: Exit signs with integral battery-operated emergency power supply, including power failure relay, test switch, AC ON pilot light, battery, and fully-automatic two-rate charger.
- B. Battery: Sealed lead acid or lead calcium cell, requiring no maintenance or replacement for 10 years under normal conditions.
- C. Light emitting diode (LED) lamping.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install units plumb and level.
- B. Aim directional lampheads as directed.
- C. Install battery inverter units on fixtures as specified.
- D. Connect to power circuit as shown on drawing.

SECTION 271100 – COMMUNICATION EQUIPMENT ROOM FITTINGS

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 WORK INCLUDED
- A. Hinged cover enclosures
- B. Cabinets
- C. Terminal blocks and accessories

1.3 REFERENCES

- A. NEMA 250 Enclosures for Electrical Equipments (1000 volts max).
- B. ANSI/NEMA ICS 1 Industrial Control and Systems.
- C. ANSI/NEMA ICS 4 Terminal Blocks for Industrial Control Equipment and Systems.
- D. ANSI/NEMA ICS 6 Enclosures for Industrial Control Equipment and Systems.
- 1.4 SUBMITTALS
- A. Submit product data under provisions of Section 260500.
- B. Shop Drawings for Equipment Panels: Include wiring schematic diagram, outline drawing and construction diagram as described in ANSI/NEMA ICS 1.

PART 2 PRODUCTS

- 2.1 HINGED COVER ENCLOSURES
- A. Construction: NEMA 250; Type 1, steel.
- B. Finish: Manufacturer's standard enamel finish.
- C. Covers:
 - 1. NEMA 1: Continuous hinge, held closed by flush latch operable by key or padlock.
 - 2. NEMA 4 or 12: Continuous hinge, gasketed door, screw/bolt locking tabs on 3 non-hinged sides of door.
- D. Panel for Mounting Terminal Blocks or Electrical Components: 14 gage steel, white enamel finish.
- 2.2 TERMINAL BLOCKS AND ACCESSORIES
- A. Terminal Blocks: ANSI/NEMA ICS 4; UL Listed.
- B. Signal and Control Terminals: Modular construction type, channel mounted; tubular pressure screw connectors, rated 300 volts.
- 2.3 FABRICATION
- A. Shop assemble enclosures and cabinets housing terminal blocks or electrical components in accordance with ANSI/NEMA ICS 6.
- B. Provide knockouts on enclosures.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install cabinets and enclosures plumb; anchor securely to wall and structural supports at each corner, minimum.
- B. Provide accessory feet for free-standing equipment enclosures.
- C. Install trim plumb.
- D. Provide grommetted openings as noted.

SECTION - 271300 COMMUNICATION SYSTEMS

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.

1.1 WORK INCLUDED

- A. Equipment and terminal backboards.
- B. Distribution raceways and outlets and components.
 - 1. Telephone
 - 2. Television
 - 3. Data/Computer
 - 4. Intercom
 - 5. Video Surveillance

1.2 RELATED SECTIONS

- A. Painting: Field painting of backboards.
- B. Conduit: Telephone service entrance raceway, sound system distribution.
- C. Supporting Devices: Supports for conduit, backboards and cabinet.
- D. Wire and Cable

1.3 QUALITY ASSURANCE

- A. Install work in accordance with telephone Utility rules and regulations.
- B. Install work in accordance with cable communications service provider.

1.4 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provision of Section 260500.
- B. Accurately record location of service entrance, conduit, outlets and termination backboards.

1.5 WARRANTY

A. In accordance with Division 01.

PART 2 PRODUCTS

2.1 TERMINATION BACKBOARDS

- A. Material: Plywood. A-C marine grade.
- B. 3/4" thick.

2.2 OUTLETS

- A. Boxes: 4-11/16" square by 2-1/8" deep. With 1-gang device ring.
- B. Raceways: 1" conduit unless noted otherwise.
- C. Floor Boxes: See Section 260533.
- D. Provide blank cover with coax connector on TV outlets.
- E. Provide one gang plate with two openings for Owner's RJ-45data and telephone outlets. Coordinate with Owner for exact opening size. Wall plate size and color shall match device plates.

2.3 WIRING

- A. TV coax: RG-6U or as requested by local CATV utility.
- B. Data and telephone: 4 pair, 22 gauge Cat. 6.
- C. Owner will arrange for wire termination with the appropriate utility or service provider.

PART 3 EXECUTION

3.1 CONDUIT

- A. Install outlet boxes per plan and details.
- B. Install conduits from outlets to above ceiling per detail.
- C. Install conduits and raceways from terminal board to above ceiling per details.

3.2 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Verify that field measurements are as shown on Drawings.
- C. Coordinate device location with casework and Architectural details.

3.3 INSTALLATION

- A. Finish paint termination backboards with durable, white enamel under the provisions of Division 9.
- B. Support raceways, backboards and cabinets under the provisions of Section 16190.
- C. Install termination backboards plumb, and attach securely at each corner.
- D. Install system outlets with raceways as shown on drawings.
- E. Install pullwire in each empty conduit.
- F. Install nameplate at terminal blocks/J-boxes or backboards with the legend "TELEPHONE" or "DATA" per Section 260553.
- G. Install one #6 ground wire from terminal board to Electrical Service Ground.
- H. Install coax in each TV outlet (box to terminal board).
- I. Install two cat 6 cables from each telephone/data outlet to terminal board/patch in Data Room.
- J. Connect cat 6 cables to connectors in occupied (user) locations and connect to terminal equipment in Data Room.

SECTION 283100- FIRE DETECTION AND ALARM SYSTEM

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 WORK INCLUDED
 - A. Fire Alarm Devices

1.3 RELATED SECTIONS

- A. Conduit
- B. Wire and Cable

1.4 REFERENCES

- A. NFPA 72 Installation, Maintenance and Use of Auxiliary Protective Signaling System for Fire Alarm Service.
- B. NFPA 72E Automatic Fire Detectors
- C. NFPA 101 Life Safety Code.
- D. ANSI 117.1- Elevator Code

1.5 REGULATORY REQUIREMENTS

- A. System: UL listed.
- B. Conform to requirements of NFPA 101.
- 1.6 QUALIFICATIONS
 - A. Manufacturer: Company specializing in fire alarm systems with five years documented experience.
 - B. Installer: Company specializing in fire alarm systems with 5 years documented experience, certified by manufacturer and State of Georgia as fire alarm installing contractor.

1.7 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 260500. Provide wiring diagrams, data sheets, and equipment ratings, layout, dimensions and finishes.
- C. Provide catalog data for equipment, equipment ratings, layout, dimensions and finishes.
- D. Submit manufacturer's installation instructions under provisions of Section 260500.

1.8 OPERATION AND MAINTENANCE DATA

- A. Submit data under provisions of Section 260500.
- B. Include operating instructions, and maintenance and repair procedures.
- C. Include manufacturer representatives' letter stating that system is operational.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Section 260500.
- B. Store and protect products under provisions of Section 260500.

PART 2 PRODUCTS

2.1 A. Acceptable Manufacturers

- 1. Notifier
- 2. Simplex
- 3. Edwards- EST
- 4. Silent Knight
- 5. Substitutions: Under provision of Section 260500.
- 6. Edwards- Vigilant

B. Initiating Devices

- 1. Ceiling Mounted Smoke Detector: NFPA 72E, ionization or photo-electric type plug-in base, integral thermal element rated 135°F, and visual indication of detector actuation, suitable for mounting on 4" outlet box. Two-wire detector with common power supply and signal circuit.
- 2. Duct Mounted Smoke Detector: Photoelectric sensor with audible and visual alarm. 24V DC operated, ceiling mounted.
- 3. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each detector to provide accessory functions specified.
- C. Signaling Devices
 - 1. Remote indicator with visual and audible alarm, test and reset switch.
- E. Wire and Cable
 - 1. Fire Alarm Power Branch Circuits: Building wire as specified in Section 260500.
 - 2. Initiating and Signal Circuits: Building wire as specified in Section 260500.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install devices.
- B. Install audible and visual signal devices in accordance with the A.D.A.
- C. Use 14 AWG minimum size conductors for fire alarm signal circuit conductors.
- D. Automatic Detector Installation: NFPA 72.
- E. Install devices as noted on drawings.
- F. Install all wiring in conduit. (Alternate plenum rated cable without conduit. Wire/cable to be routed neatly along structural elements and secured in place).

3.2 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 260500.
- B. Test in accordance with NFPA 72 requirements.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Provide manufacturer's field services under provisions of Section 260500.
- B. Include services of certified technician to supervise installation, adjustments, final connections, and system testing.

3.4 WIRE AND CABLE COLOR CODE

- A. Provide fire alarm conductors with color coded insulation as follows:
 - 1. Detector Power Supply: Violet and brown.
 - 2. Signal Device Circuit: Blue (positive), white (negative).

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SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

RELATED DOCUMENTS 1.1

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

1.2 SUMMARY

Section Includes: Soil treatment with termiticide. A.

1.3 ACTION SUBMITTALS

Product Data: For each type of termite control product. Include the EPA-Registered Label for termiticide A. products.

INFORMATIONAL SUBMITTALS 1.4

- Product Certificates: For termite control products, from manufacturer. A.
- Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following: Β.

 - Date and time of application. Moisture content of soil before application. 2. 3.
 - Termiticide brand name and manufacturer.
 - 4. Quantity of undiluted termiticide used.
 - 5. Dilutions, methods, volumes used, and rates of application.
 - Areas of application. 6.
 - Water source for application.
- Warranties: Sample of special warranties. C.

1.5 **OUALITY ASSURANCE**

- Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the A. EPA-Registered Label.
- Source Limitations: Obtain termite control products from single source from single manufacturer. Β.

1.6 PROJECT CONDITIONS

- Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and Α. requirements of authorities having jurisdiction.
- Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction. Β.

1.7 WARRANTY

- A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
 - Warranty Period: Three years from date of Substantial Completion. 1.

1.8 MAINTENANCE SERVICE

Continuing Service: Beginning at Final Completion, provide 12 months' continuing service including monitoring, inspection, and re-treatment for occurrences of termite activity. Provide a standard continuing A. service agreement. State services, obligations, conditions, terms for agreement period, and terms for future renewal options.

PART 2 - PRODUCTS

- 2.1SOIL TREATMENT
 - Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having A. jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for
application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

- 1. Products: Subject to compliance with requirements, provide one of the following:
 - BASF Corporation, Agricultural Products; Termidor. Bayer Environmental Science; Premise 75. a.
 - b.
 - FMC Corporation, Agricultural Products Group; Dragnet FT. c.
 - d. Syngenta; Demon TC
- 2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than three years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 **EXAMINATION**

- Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements A. for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.
- Proceed with application only after unsatisfactory conditions have been corrected. Β.

3.2 PREPARATION

- General: Comply with the most stringent requirements of authorities having jurisdiction and with A. manufacturer's written instructions for preparation before beginning application of termite control treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- Β. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
 - 1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

General: Comply with the most stringent requirements of authorities having jurisdiction and with A. manufacturer's EPA-Registered Label for products.

APPLYING SOIL TREATMENT 3.4

- Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required A. for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
 - Slabs-on-Grade and Basement Slabs: Under all newly performed ground-supported slab construction, including footings, elevator pits, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed. 1.
 - 2. Foundations: Under all newly performed foundations, adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings. 3.
 - Masonry: Treat voids of all newly laid masonry. Δ Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- Β. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other E. construction activities following application.

END OF SECTION 313116

TERMITE CONTROL