

FOULGER-PRATT HEADQUARTERS
PROJECT MANUAL

12435 PARK POTOMAC AVENUE
POTOMAC, MD 20852

ISSUED FOR PERMIT AND BID
May 28, 2015



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Not Used

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Not Used

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Not Used

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Not Used

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Not Used

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Not Used

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Not Used

Division 34 – Transportation

Not Used

END OF TOC

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Work under separate contracts.
5. Access to site.
6. Coordination with occupants.
7. Work restrictions.
8. Specification and drawing conventions.
9. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION

A. Project Identification: Foulger- Pratt Headquarters.

1. Project Location: 12435 Park Potomac Ave., Potomac, MD.

B. Owner: Foulger-Pratt Development, LLC, 9600 Blackwell Road, Suite 200, Rockville, MD 20850.

1. Owner's Representative: Joshua M. Etter, Development Associate, Foulger-Pratt Development, LLC. 9600 Blackwell Road, Suite 200, Rockville, MD 20850.

C. Architect: Perkins+Will, Inc., 1250 24th Street NW, Suite 800, Washington, DC 20037.

D. Project Web Site: A project Web site administered by the Architect will be used for purposes of managing communication and documents during the construction stage.

1. See Section 01 31 00 "Project Management and Coordination." for requirements for using Project Web site.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
 - 1. Fit-out Level 02 of a newly constructed office building excluding work in the building core. Work to include new partitions, finishes, lighting, mechanical, electrical, fire protection, and plumbing.
- B. Type of Contract.
 - 1. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

- A. 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.
- B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to Level 02 of the building.
 - 2. Driveways, Walkways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials unless approved by the owner.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.5 COORDINATION WITH OCCUPANTS

1.6 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 a.m. to 5 p.m., Monday through Friday, unless otherwise indicated.

1. Restrictions on times permitted for work coordinate with sound ordinances in Montgomery County.
- 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 Owner not less than two days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

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

3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.8 MISCELLANEOUS PROVISIONS

- A. Not used.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
 - 2. Unit-cost allowances.
 - 3. Quantity allowances.
 - 4. Contingency allowances.
 - 5. Testing and inspecting allowances.
- C. Related Requirements:
 - 1. Section 01 22 00 "Unit Prices" for procedures for using unit prices.
 - 2. Section 01 40 00 "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.

1.2 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

1.3 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.4 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.5 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.6 UNIT-COST AND QUANTITY ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Architect under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials selected by Architect under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

1.7 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.
- B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the contingency allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, taxes, insurance, equipment rental, and similar costs.
- C. Change Orders authorizing use of funds from the contingency allowance will include Contractor's related costs and reasonable overhead and profit margins.
- D. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

1.8 TESTING AND INSPECTING ALLOWANCES

- A. Testing and inspecting allowances include the cost of engaging testing agencies, actual tests and inspections, and reporting results.
- B. The allowance does not include incidental labor required to assist the testing agency or costs for retesting if previous tests and inspections result in failure. The cost for incidental labor to assist the testing agency shall be included in the Contract Sum.

- C. Costs of services not required by the Contract Documents are not included in the allowance.
- D. At Project closeout, credit unused amounts remaining in the testing and inspecting allowance to Owner by Change Order.

1.9 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
 - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
 - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
 - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
 - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
 - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 - 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

END OF SECTION

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

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

1.3 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- 1. Description: Refer to each Section for materials to provide unit pricing

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2. Unit of Measurement: To be determined by the Section.
3. Quantity Allowance: Coordinate unit price with allowance adjustment requirements in Section 01 21 00 "Allowances."

END OF SECTION

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. 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.

1.3 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

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3.1 SCHEDULE OF ALTERNATES

1. See sheet A00-01 for list of alterates.

END OF SECTION

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use facsimile of form provided in Project Manual.
 - 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.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven 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.

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:
- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

SUBSTITUTION PROCEDURES

- b. Requested substitution provides sustainable design characteristics that specified product provided.
- c. Requested substitution will not adversely affect Contractor's construction schedule.
- d. Requested substitution has received necessary approvals of authorities having jurisdiction.
- e. Requested substitution is compatible with other portions of the Work.
- f. Requested substitution has been coordinated with other portions of the Work.
- g. Requested substitution provides specified warranty.
- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION

REQUEST FOR SUBSTITUTION

TO: Perkins + Will
1315 Peachtree Street, N.E.
Atlanta, Georgia 30309

FROM:

Name of manufacturer

Street address

City and state

Phone number and name of person to contact

PROJECT: Name:
City, State:
Architect's Job Number:

1. Specification Section and Paragraph numbers of product specified
_____.
2. Proposed Substitute
 - A. Name and Model No.:
 - B. Description:
 - C. Attach applicable Submittals as required by the referenced Specification Section, i.e. Product Data, Materials List, Shop Drawings, Samples, Design Data, Test Reports, and Certificates. Attach Shop Drawings to the effect of the proposed substitution on adjacent components of the Work.
 - D. Insert Numbers of applicable reference standards:
 - E. Attach a color chart, if applicable.
 - F. Attach installation instructions.
3. Manufacturer's Reputation: Attach the following:
 - A. Evidence of reputation for prompt delivery.
 - B. Evidence of reputation for efficiency in servicing products.
4. Comparison: Attach an itemized comparison of the proposed substitution with product specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effects.
5. Changes in Work: Attach data relating to changes required in other work to permit use of proposed substitution and changes required in construction schedule and overall contract time. Coordinate changes or modifications needed to other parts of

the Work and to construction performed by the Owner and separate Contractors that will be necessary to accommodate the proposed substitution.

6. Cost Data: Attach accurate cost data on proposed substitution in comparison with product specified.
7. Previous Installation: Provide the following information on similar projects on which proposed substitution was used, list projects in the locale of the project primarily and then in other areas that best represent its application on this project:

<u>Name and Address of Project</u>	<u>Date of Installation</u>	<u>Name, Address, and Phone # of Architect</u>
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A.

B.

C.

D.

8. In making a request for substitution, the Manufacturer represents that:
 - A. He has examined the Drawings and Specifications and has determined that, to the best of his knowledge, the proposed substitution is appropriate for the use intended in the Drawings and Specifications.
 - B. He will provide the same or better warranty for substitution as for product or method specified.
 - C. The product is equal or better in quality and serviceability to the specified item.
9. In making a request for substitution, the Installer and Contractor each represents that:
 - A. He will coordinate the installation of accepted substitution into the Work, making such changes as may be required for the Work to be complete in all respects.
 - B. He waives all claims for additional costs related to substitution which consequently become apparent.
 - C. Cost data is complete and includes all related costs under his Contract, but excludes costs under separate contracts and the Architect's redesign costs.

- D. The substitution meets the requirements of the Contract Documents, regardless of the evidence submitted or any review or independent investigation by the Owner or the Architect.

Name of Manufacturer and signature of Manufacturer's Rep.	Date
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Name of Installer and signature of Installer's Rep.	Date
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Name of Contractor and signature of Contractor's Rep.	Date
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8. In making a request for substitution, the Manufacturer represents that:

- A. He has examined the Drawings and Specifications and has determined that, to the best of his knowledge, the proposed substitution is appropriate for the use intended in the Drawings and Specifications.
- B. He will provide the same or better warranty for substitution as for product or method specified.
- C. The product is equal or better in quality and serviceability to the specified item.

Name of Manufacturer and signature of Manufacturer's Rep.	Date
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Name of Contractor and signature	Date
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SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 MINOR CHANGES IN THE WORK

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

1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Owner's construction representative 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 Owner's construction representative are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - e. Quotation Form: Use forms provided by Owner. Sample copies are included in Project Manual.
- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owner's construction representative.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 01 25 00 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Work Change Proposal Request Form: Use form provided by Owner. Sample copy is included in Project Manual.

1.4 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 22 00 "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, General Contractor 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 or similar standardized form. 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)

END OF SECTION

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
 - 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 and Owner at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
 - 3. Sub-schedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide sub-schedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
 - 1. Identification: Include the following Project identification on the schedule of values:

- a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
 3. 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.
 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
 7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
 8. 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.
 9. 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.

1.3 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: 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 15th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- E. Application for Payment Forms: Use forms acceptable to Owner and Architect for Applications for Payment. Sample copies are included in Project Manual.
- F. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- G. Transmittal: Submit one PDF signed and notarized copy of each Application for Payment to Architect and Owner by a method ensuring receipt within 24 hours. 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. Contractor's construction schedule (preliminary if not final).
 - 4. Schedule of unit prices.
 - 5. Submittal schedule (preliminary if not final).
 - 6. List of Contractor's staff assignments.
 - 7. List of Contractor's principal consultants.
 - 8. Copies of building permits.
 - 9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

10. Initial progress report.
 11. Report of preconstruction conference.
 12. Certificates of insurance and insurance policies.
- 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 Certificates of Partial 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 G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
 5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
 6. AIA Document G707-1994, "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.
 9. Final liquidated damages settlement statement.

PART 2 - PRODUCT S (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Coordination drawings.
 - 2. Requests for Information (RFIs).
 - 3. Project Web site.
 - 4. Project meetings.
- B. Related Requirements:
 - 1. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

1.2 DEFINITIONS

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

1.3 INFORMATIONAL SUBMITTALS

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

1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
 2. Preparation of the schedule of values.
 3. Installation and removal of temporary facilities and controls.
 4. Delivery and processing of submittals.
 5. Progress meetings.
 6. Pre-installation conferences.
 7. Project closeout activities.
 8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical

- Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.

- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of Project Web site. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT WEB SITE

- A. Provide, administer, and use Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:
1. Project directory.

2. Project correspondence.
 3. Meeting minutes.
 4. Contract modifications forms and logs.
 5. RFI forms and logs.
 6. Task and issue management.
 7. Photo documentation.
 8. Schedule and calendar management.
 9. Submittals forms and logs.
 10. Payment application forms.
 11. Drawing and specification document hosting, viewing, and updating.
 12. Online document collaboration.
 13. Reminder and tracking functions.
 14. Archiving functions.
 15. Punch list.
- B. Provide up to seven Project Web site user licenses for use of Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for Project Web site users if requested by owner
- C. On completion of Project, provide one complete archive copyies of Project Web site files to Owner and to Architect in a digital storage format acceptable to Architect.
- D. Provide one of the following Project Web site software packages under their current published licensing agreements:
1. Autodesk, Buzzsaw.
 2. Autodesk, Constructware.
 3. Meridian Systems, Prolog.
 4. Newforma
- E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Architect.

1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. Sustainable design requirements.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Working hours.
 - p. Owner's occupancy requirements.
 - q. Responsibility for temporary facilities and controls.
 - r. Procedures for moisture and mold control.
 - s. Procedures for disruptions and shutdowns.
 - t. Construction waste management and recycling.
 - u. Parking availability.
 - v. Office, work, and storage areas.
 - w. Equipment deliveries and priorities.
 - x. First aid.
 - y. Security.
 - z. Progress cleaning.
 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity 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.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.

- e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
 - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Conduct progress meetings at regular intervals.
- 1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 - 2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.

- b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
- 3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
 - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- 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.

1.3 COORDINATION

- A. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 1. Working electronic copy of schedule file, where indicated.
 2. PDF electronic file.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 3. Total Float Report: List of all activities sorted in ascending order of total float.
 4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at monthly intervals.
- G. Site Condition Reports: Submit at time of discovery of differing conditions.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 - a. HVAC Equipment
 - b. Light Fixtures
 - c. Demountable Partitions.
 - d. Millwork.
 - e. Door Hardware.
 3. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Owner's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 15 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
 1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.

- f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 - 5. Work Stages: Indicate important stages of construction for each major portion of the Work.
 - D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
 - E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered Requests for Information.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
 - 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.
 - G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)
- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed.
 - B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE CPM SCHEDULE
- A. General: Prepare network diagrams using AON (activity-on-node) format.
 - B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

- C. CPM Schedule: Prepare Contractor's construction schedule using a cost- and resource-loaded, time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
 2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 3. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.

- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
 - 1. Contractor or subcontractor and the Work or activity.
 - 2. Description of activity.
 - 3. Main events of activity.
 - 4. Immediate preceding and succeeding activities.
 - 5. Early and late start dates.
 - 6. Early and late finish dates.
 - 7. Activity duration in workdays.
 - 8. Total float or slack time.
 - 9. Average size of workforce.
 - 10. Dollar value of activity (coordinated with the schedule of values).
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
 - 1. Identification of activities that have changed.
 - 2. Changes in early and late start dates.
 - 3. Changes in early and late finish dates.
 - 4. Changes in activity durations in workdays.
 - 5. Changes in the critical path.
 - 6. Changes in total float or slack time.
 - 7. Changes in the Contract Time.

2.4 REPORTS

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

17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

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

END OF SECTION

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. Related Requirements:
 - 1. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS

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

1.3 QUALITY ASSURANCE

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

1.4 USAGE RIGHTS

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

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Digital Images: Provide images in JPG format, with minimum size of 8 megapixels.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

- A. Photographer: Engage a qualified photographer to take construction photographs.
- B. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
 - 1. 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.
 - 1. Date and Time: Include date and time in file name for each image.
 - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect and Owner.
- D. Preconstruction Photographs: Before commencement of work, 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 a minimum of 10 photographs to show existing conditions adjacent to property before starting the Work.
- E. Periodic Construction Photographs: Take a minimum of 20 photographs weekly, with timing each month adjusted to coincide 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. Final Completion Construction Photographs: Take a minimum of 20 color photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.
- G. Additional Photographs: Architect or Owner may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
 - 1. Three days' notice will be given, where feasible.
 - 2. In emergency situations, take additional photographs within 24 hours of request.

3. Circumstances that could require additional photographs include, but are not limited to, the following:
 - a. Special events planned at Project site.
 - b. Immediate follow-up when on-site events result in construction damage or losses.
 - c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
 - d. Substantial Completion of a major phase or component of the Work.
 - e. Extra record photographs at time of final acceptance.
 - f. Owner's request for special publicity photographs.

END OF SECTION

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 2. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

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

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.

- b. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
 - c. Partition, power, and RCP files will be provided as a starting point for preparation of submittals and Project record drawings. Shop drawings are not allowed to be direct copies of the provided files and must include field verified and coordinated information.
 - d. CAD files specified above will be provided at no cost. Additional files from the Contract Drawings will be provided after the execution of the data licensing agreement and a fee of \$750.00 is paid to Perkins + Will for processing.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 - 1. Initial Review: Allow 10 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 - 3. Resubmittal Review: Allow 10 days for review of each resubmittal.
 - 4. Each submittal will have one resubmittal, if additional resubmittals are required the contractor will pay an hourly fee for review.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 - 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-06 10 00.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-06 10 00.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number, numbered consecutively.
 - q. Submittal and transmittal distribution record.
 - r. Other necessary identification.
 - s. Remarks.
5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations: Identify deviations from the Contract Documents on submittals.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- 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

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.
 - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect, return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
3. Action Submittals: Submit digital copy of each submittal unless otherwise indicated.
4. Informational Submittals: Submit digital copy of each submittal unless otherwise indicated. Architect will not return a copy.
5. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
 - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
 - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.

SUBMITTAL PROCEDURES

- g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 - 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 - 5. Submit Product Data before or concurrent with Samples.
 - 6. Submit Product Data in the following format:
 - a. PDF electronic file.
 - b. One digital copy of Product Data unless otherwise indicated. Architect, will return one copy.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
 - 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 - 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 - 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample set; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 1. Submit product schedule in the following format:
 - a. PDF electronic file.
- F. Coordination Drawings Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

- U. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

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

END OF SECTION

PERKINS + WILL

Electronic File Transfer Agreement (architect and contractor / sub-contractor)

Name	Date:	May 28, 2015
Address	Project Name:	Foulger-Pratt Headquarters
Description of Data:	Foulger-Pratt Headquarters Cad files	Project No: 860424

The undersigned Contractor / Subcontractor hereby requests that Perkins+Will provide drawing files in an electronic file format.

The undersigned acknowledges that the true and accurate record of the design is the most recent issued printed hard copy of the design, not the requested electronic data. The undersigned agrees to hold harmless and indemnify Perkins+Will from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising out of or in any way connected with the modification, misinterpretation, misuse, or reuse by others of the electronic information provided by Perkins+Will.

The drawings files are for use on the above-mentioned project only and shall not be copied or distributed. The use of these drawing files does not relieve the Contractor / Subcontractor of any of the requirements or responsibilities described in the Contract Documents. When modifying the drawings for project-related services, the Contractor/Subcontractor shall add its company name, address, telephone number, and contact information to the title block of each sheet, and all references to the Architect and its consultants shall be removed from the drawing.

The fee for preparation and forwarding of the drawing file(s), described above is \$750.00
(The above mentioned fee is being waived, one time only, on the Turner Construction Company request.)

Upon return receipt of this signed

Name

Title

Date

Acknowledged and Accepted

Signature of Recipient

Company

Title

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

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

1.3 CONFLICTING REQUIREMENTS

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

1.4 INFORMATIONAL SUBMITTALS

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

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

1.5 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 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 re-inspecting.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - 5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

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

- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
 - 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 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. 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens, assemblies, and 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.
- J. 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. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow five days for initial review and each re-review of each mockup.
 - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 6. Demolish and remove mockups when directed unless otherwise indicated.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
 - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
 - 1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. 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.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.

- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

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

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "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

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

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

1.2 INDUSTRY STANDARDS

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

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

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

1. AABC - Associated Air Balance Council; www.aabc.com.
2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
3. AAPFCO - Association of American Plant Food Control Officials; www.aapfco.org.
4. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
5. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
6. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
7. ABMA - American Boiler Manufacturers Association; www.abma.com.
8. ACI - American Concrete Institute; (Formerly: ACI International); www.abma.com.
9. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
10. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
11. AF&PA - American Forest & Paper Association; www.afandpa.org.
12. AGA - American Gas Association; www.aga.org.
13. AHAM - Association of Home Appliance Manufacturers; www.aham.org.
14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
15. AI - Asphalt Institute; www.asphaltinstitute.org.
16. AIA - American Institute of Architects (The); www.aia.org.
17. AISC - American Institute of Steel Construction; www.aisc.org.
18. AISI - American Iron and Steel Institute; www.steel.org.
19. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
20. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
21. ANSI - American National Standards Institute; www.ansi.org.
22. AOSA - Association of Official Seed Analysts, Inc.; www.aosaseed.com.
23. APA - APA - The Engineered Wood Association; www.apawood.org.
24. APA - Architectural Precast Association; www.archprecast.org.
25. API - American Petroleum Institute; www.api.org.

26. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
27. ARI - American Refrigeration Institute; (See AHRI).
28. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
29. ASCE - American Society of Civil Engineers; www.asce.org.
30. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
32. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
33. ASSE - American Society of Safety Engineers (The); www.asse.org.
34. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
35. ASTM - ASTM International; www.astm.org.
36. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
37. AWEA - American Wind Energy Association; www.awea.org.
38. AWI - Architectural Woodwork Institute; www.awinet.org.
39. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
40. AWWPA - American Wood Protection Association; www.awpa.com.
41. AWS - American Welding Society; www.aws.org.
42. AWWA - American Water Works Association; www.awwa.org.
43. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
44. BIA - Brick Industry Association (The); www.gobrick.com.
45. BICSI - BICSI, Inc.; www.bicsi.org.
46. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.org.
47. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bissc.org.
49. CDA - Copper Development Association; www.copper.org.
50. CEA - Canadian Electricity Association; www.electricity.ca.
51. CEA - Consumer Electronics Association; www.ce.org.
52. CFFA - Chemical Fabrics and Film Association, Inc.; www.chemicalfabricsandfilm.com.
53. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
54. CGA - Compressed Gas Association; www.cganet.com.
55. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
56. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
57. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
58. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CPA - Composite Panel Association; www.pbmdf.com.
60. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
61. CRRC - Cool Roof Rating Council; www.coolroofs.org.
62. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
63. CSA - Canadian Standards Association; www.csa.ca.
64. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
65. CSI - Construction Specifications Institute (The); www.csinet.org.
66. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
68. CWC - Composite Wood Council; (See CPA).

69. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
70. DHI - Door and Hardware Institute; www.dhi.org.
71. ECA - Electronic Components Association; (See ECIA).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. ECIA - Electronic Components Industry Association; www.eciaonline.org.
74. EIA - Electronic Industries Alliance; (See TIA).
75. EIMA - EIFS Industry Members Association; www.eima.com.
76. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
77. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
78. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. EVO - Efficiency Valuation Organization; www.evo-world.org.
80. FCI - Fluid Controls Institute; www.fluidcontrolsintstitute.org.
81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
83. FM Approvals - FM Approvals LLC; www.fmglobal.com.
84. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; www.floridarooft.com.
86. FSA - Fluid Sealing Association; www.fluidsealing.com.
87. FSC - Forest Stewardship Council U.S.; www.fscus.org.
88. GA - Gypsum Association; www.gypsum.org.
89. GANA - Glass Association of North America; www.glasswebsite.com.
90. GS - Green Seal; www.greenseal.org.
91. HI - Hydraulic Institute; www.pumps.org.
92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
94. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
95. HPW - H. P. White Laboratory, Inc.; www.hpwhite.com.
96. IAPSC - International Association of Professional Security Consultants; www.iapsc.org.
97. IAS - International Accreditation Service; www.iasonline.org.
98. IAS - International Approval Services; (See CSA).
99. ICBO - International Conference of Building Officials; (See ICC).
100. ICC - International Code Council; www.iccsafe.org.
101. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
102. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
103. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
104. IEC - International Electrotechnical Commission; www.iec.ch.
105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
109. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
110. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.okstate.edu.
111. ILI - Indiana Limestone Institute of America, Inc.; www.ili.ai.com.

112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
116. ISO - International Organization for Standardization; www.iso.org.
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; www.itu.int/home.
119. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; www.lightning.org.
122. MBMA - Metal Building Manufacturers Association; www.mbma.com.
123. MCA - Metal Construction Association; www.metalconstruction.org.
124. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
125. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
126. MHIA - Material Handling Industry of America; www.mhia.org.
127. MIA - Marble Institute of America; www.marble-institute.com.
128. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
129. MPI - Master Painters Institute; www.paintinfo.com.
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
131. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
132. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
133. NADCA - National Air Duct Cleaners Association; www.nadca.com.
134. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
135. NBGOA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
136. NBI - New Buildings Institute; www.newbuildings.org.
137. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
138. NCMA - National Concrete Masonry Association; www.ncma.org.
139. NEBB - National Environmental Balancing Bureau; www.nebb.org.
140. NECA - National Electrical Contractors Association; www.necanet.org.
141. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
142. NEMA - National Electrical Manufacturers Association; www.nema.org.
143. NETA - InterNational Electrical Testing Association; www.netaworld.org.
144. NFHS - National Federation of State High School Associations; www.nfhs.org.
145. NFPA - National Fire Protection Association; www.nfpa.org.
146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; www.nfrc.org.
148. NHLA - National Hardwood Lumber Association; www.nhla.com.
149. NLGA - National Lumber Grades Authority; www.nlga.org.
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
152. NRCA - National Roofing Contractors Association; www.nrca.net.
153. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
154. NSF - NSF International; www.nsf.org.

155. NSPE - National Society of Professional Engineers; www.nspe.org.
156. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
158. NWFA - National Wood Flooring Association; www.nwfa.org.
159. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
160. PDI - Plumbing & Drainage Institute; www.pdionline.org.
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
163. RFCI - Resilient Floor Covering Institute; www.rfci.com.
164. RIS - Redwood Inspection Service; www.redwoodinspection.com.
165. SAE - SAE International; www.sae.org.
166. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
167. SDI - Steel Deck Institute; www.sdi.org.
168. SDI - Steel Door Institute; www.steeldoor.org.
169. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; www.siaonline.org.
172. SJI - Steel Joist Institute; www.steeljoist.org.
173. SMA - Screen Manufacturers Association; www.smainfo.org.
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
175. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
176. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
177. SPIB - Southern Pine Inspection Bureau; www.spib.org.
178. SPRI - Single Ply Roofing Industry; www.spri.org.
179. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
180. SSINA - Specialty Steel Industry of North America; www.ssina.com.
181. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
182. STI - Steel Tank Institute; www.steel tank.com.
183. SWI - Steel Window Institute; www.steelwindows.com.
184. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
185. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
186. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; www.masonrysociety.org.
191. TPI - Truss Plate Institute; www.tpinst.org.
192. TPI - Turfgrass Producers International; www.turfgrasssod.org.
193. TRI - Tile Roofing Institute; www.tilerroofing.org.
194. UL - Underwriters Laboratories Inc.; www.ul.com.
195. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
196. USAV - USA Volleyball; www.usavolleyball.org.
197. USGBC - U.S. Green Building Council; www.usgbc.org.
198. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
199. WASTEC - Waste Equipment Technology Association; www.wastec.org.
200. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.

201. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
202. WDMA - Window & Door Manufacturers Association; www.wdma.com.
203. WI - Woodwork Institute; www.wicnet.org.
204. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
205. WWPA - Western Wood Products Association; www.wwpa.org.

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

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

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

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.

3. DSCC - Defense Supply Center Columbus; (See FS).
 4. FED-STD - Federal Standard; (See FS).
 5. FS - Federal Specification; Available from DLA Document Services;
www.quicksearch.dla.mil.
 - a. Available from Defense Standardization Program; www.dsp.dla.mil.
 - b. Available from General Services Administration; www.gsa.gov.
 - c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.
 6. MILSPEC - Military Specification and Standards; (See DOD).
 7. USAB - United States Access Board; www.access-board.gov.
 8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS; California Department of Health Services; (See CDPH).
 4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
 6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
 7. TFS; Texas A&M Forest Service; Sustainable Forestry and Economic Development; www.txforestservation.tamu.edu.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

1.5 FIELD 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 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. Keep office clean and orderly.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
 - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 13

at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 "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 01 10 00 "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.
 - 1. Connect temporary sewers to private system indicated as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. 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 existing before initial use.
- E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

- F. Heating: Provide temporary heating 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.
- G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- I. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - 1. Connect temporary service to Owner's existing power source, as directed by Owner.
- J. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- K. Telephone Service: Provide temporary telephone service in common-use facilities for use by all 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.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
 - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

4. 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.
5. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

3.3 SUPPORT FACILITIES INSTALLATION

- A. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- B. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- C. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- D. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touchup signs so they are legible at all times.
- E. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 "Execution."
- 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. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
1. Do not load elevators beyond their rated weight capacity.
 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- I. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- D. 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.
- E. 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.
- F. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

- G. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- H. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- I. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for requests for substitutions.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

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

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 10 days of receipt of request, or five days of receipt of additional information or documentation, whichever is later.

- a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures."
- b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

- B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

- C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "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.
- 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 unless otherwise indicated.
 - b. Non-restricted 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 unless otherwise indicated.
 - b. Non-restricted 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 01 25 00 "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

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Coordination of Owner-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for limits on use of Project site.
 - 2. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
 - 3. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

- A. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Certified Surveys: Submit two copies signed by professional engineer.
- D. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. 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.

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

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish 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 and Construction Manager 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. Building Lines and Levels: Locate and lay out control lines and levels for structures, and column grids 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.
- D. 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 and Construction Manager.

3.4 FIELD ENGINEERING

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

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

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

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.

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

3.7 PROGRESS CLEANING

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

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

- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	EST. QUANTITY	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								

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Transformers								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								

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Other:								
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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	EST. QUANTITY	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

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FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Transformers								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

Other:								
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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
 - 1. Section 02 41 19 "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.

1.2 DEFINITIONS

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

1.3 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Facilitate recycling and salvage of materials.

1.4 INFORMATIONAL SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. 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.
- H. Qualification Data: For waste management coordinator.

1.5 QUALITY ASSURANCE

- A. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
 - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

- 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.
 - 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until installation.
 - 4. Protect items from damage during transport and storage.
 - 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Owner's Use:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include, but are not limited to, the following:
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.

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

3.4 RECYCLING DEMOLITION WASTE

- A. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- B. Metals: Separate metals by type.
 1. Structural Steel: Stack members according to size, type of member, and length.
 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
- C. 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.
- D. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- E. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- F. Carpet Tile: Remove debris, trash, and adhesive.
 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- G. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- H. Conduit: Reduce conduit to straight lengths and store by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

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

4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

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

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

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

A. 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 having jurisdiction.

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

B. Burning: Do not burn waste materials.

C. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

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

3.7 SAMPLE FORMS

END OF SECTION

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Section 01 32 33 "Photographic Documentation" for submitting final completion construction photographic documentation.
 - 2. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 4. Section 01 79 00 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

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

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion 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 Owner. 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 Owner's signature for receipt of submittals.
 - 5. Submit test/adjust/balance records.
 - 6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
 - 1. Advise Owner of pending insurance changeover requirements.
 - 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 3. Complete startup and testing of systems and equipment.
 - 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 - 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 "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 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

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

1. Submit a final Application for Payment according to Section 01 29 00 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report and warranty.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

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

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Submit list of incomplete items in the following format:
 - a. MS Excel electronic file. Architect will return annotated copy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
- 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum 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. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. 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 light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - p. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 01 50 00 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - 4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
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.
- C. 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.
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 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 - 1. Title page.
 - 2. Table of contents.
 - 3. Manual contents.
- C. Title Page: Include the following information:
 - 1. Subject matter included in manual.
 - 2. Name and address of Project.
 - 3. Name and address of Owner.
 - 4. Date of submittal.
 - 5. Name and contact information for Contractor.
 - 6. Name and contact information for 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.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
 - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 - 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting

bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.2 EMERGENCY MANUALS

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

2.3 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 is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.

8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
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.

2.4 PRODUCT MAINTENANCE MANUALS

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

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

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

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

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.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
- F. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
- B. Related Requirements:
 - 1. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS

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

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Record data as soon as possible after obtaining it.
 - c. Record and check the markup before enclosing concealed installations.
 2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect Owner. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Format: DWG, Version 2013, Microsoft Windows operating system.
 3. Format: Annotated PDF electronic file with comment function enabled.
 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 5. Refer instances of uncertainty to Architect for resolution.
 6. Architect will furnish Contractor digital data files of the Contract Drawings previously indicated for use in recording information.
- 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: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name

each file with the sheet identification. Include identification in each digital data file.

4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect and Owner.
 - 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. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

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 annotated PDF electronic file.

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 PDF electronic file.

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

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 INFORMATIONAL SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
 - 1. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to demonstration and training.

1.5 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

- c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.
- 4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 "Operation and Maintenance Data."

3.2 INSTRUCTION

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

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.
- C. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

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

END OF SECTION

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of test equipment, instrumentation, and tools for commissioning.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 01 33 00 "Submittal Procedures" for submittal procedures requirements for commissioning.
2. Section 01 77 00 "Closeout Procedures" for certificate of Construction Phase Commissioning Completion submittal requirements.
3. Section 01 78 23 "Operation and Maintenance Data" for preliminary operation and maintenance data submittal.
4. Section 21 08 00 "Commissioning of Fire Suppression" for technical commissioning requirements for fire suppression.
5. Section 22 08 00 "Commissioning of Plumbing" for technical commissioning requirements for plumbing.
6. Section 23 08 00 "Commissioning of HVAC" for technical commissioning requirements for HVAC.
7. Section 26 08 00 "Commissioning of Electrical Systems" for technical commissioning requirements for electrical systems.
8. Section 27 08 00 "Commissioning of Communications" for technical commissioning requirements for communications systems.
9. Section 28 08 00 "Commissioning of Electronic Safety and Security" for technical commissioning requirements for electronic safety and security systems.

1.2 DEFINITIONS

- A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests and commissioning test demonstrations.
- B. Basis-of-Design Document: A document prepared by Owner, Architect, or Commissioning Authority that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.

- C. Commissioning Authority: An entity engaged by Owner, and identified in Section 01 10 00 "Summary," to evaluate Commissioning-Process Work.
- D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation requirements of commissioning.
- E. Commissioning: A quality-focused process for verifying and documenting that the facility and all of its systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. The requirements specified here are limited to the construction phase commissioning activities. The scope of commissioning is defined in Section 01 10 00 "Summary."
- F. Construction Phase Commissioning Completion: The stage of completion and acceptance of commissioning when resolution of deficient conditions and issues discovered during commissioning and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date Construction Phase Commissioning Completion is achieved. See Section 01 77 00 "Closeout Procedures" for certificate of Construction Phase Commissioning Completion submittal requirements.
 - 1. Commissioning is complete when the work specified in this Section and related Sections has been completed and accepted, including, but not limited to, the following:
 - a. Completion of tests and acceptance of test results.
 - b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
 - c. Comply with requirements in Section 01 79 00 "Demonstration and Training."
 - d. Completion and acceptance of submittals and reports.
- G. Owner's Project Requirements: A document written by Owner, Architect, or Commissioning Authority that details the functional requirements of a project and the expectations of how it will be used and operated, including Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- H. Owner's Witness: Commissioning Authority, Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.
- I. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- J. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- K. Sampling Procedures and Tables for Inspection by Attributes: As defined in ASQ Z1.4.

1.3 INFORMATIONAL SUBMITTALS

- A. Comply with requirements in Section 01 33 00 "Submittal Procedures" for submittal procedures general requirements for commissioning.
- B. Commissioning Plan Information:
 - 1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors to the performance of the various commissioning requirements.
 - 2. Schedule of commissioning activities, integrated with the construction schedule. Comply with requirements in Section 01 32 00 "Construction Progress Documentation" for construction schedule general requirements for commissioning.
 - 3. Contractor personnel and subcontractors to participate in each test.
 - 4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.
- C. Commissioning schedule.
- D. Two-week look-ahead schedules.
- E. Test Reports:
 - 1. Pre-Startup Report: Prior to start up of equipment or a system, submit signed, completed construction checklists.
 - 2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
 - 3. Commissioning Issues Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
 - 4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
 - 5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
 - 6. System Alarm Logs: Daily, at the start of days following a day in which tests were performed, submit print-out of log of alarms that occurred since the last log was printed.
- F. Construction Checklists:
 - 1. Material checks.
 - 2. Installation checks.
 - 3. Startup procedures, where required.

1.4 CLOSEOUT SUBMITTALS

- A. Commissioning Report:
 - 1. At Construction Phase Commissioning Completion, include the following:
 - a. Pre-startup reports.
 - b. Approved test procedures

- c. Test data forms, completed and signed.
 - d. Progress reports.
 - e. Commissioning issues report log.
 - f. Commissioning issues reports showing resolution of issues.
 - g. Correspondence or other documents related to resolution of issues.
 - h. Other reports required by commissioning.
 - i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction Phase Commissioning Completion.
 - j. Report shall include commissioning work of Contractor.
- B. Request for Certificate of Construction Phase Commissioning Completion.
- C. Operation and maintenance data.

1.5 COMMISSIONING AUTHORITY'S RESPONSIBILITIES

- A. Commissioning Authority Responsibilities: Comply with requirements in Section 01 10 00 "Summary."

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Test equipment and instrumentation required to perform the commissioning shall remain the property of Contractor unless otherwise indicated.
- B. Test equipment and instrumentation required to perform commissioning shall comply with the following criteria:
 - 1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
 - 2. Calibrated and certified.
 - a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated. Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever is more frequent, but not less than within six months of initial use on Project. Calibration tags permanently affixed.
 - b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.
 - 3. Maintain test equipment and instrumentation.
 - 4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate or perform work on its equipment.
 - 1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
 - 2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

2.3 REPORT FORMAT AND ORGANIZATION

- A. General Format and Organization:
 - 1. Bind report in three-ring binders.
 - 2. Label the front cover and spine of each binder with the report title, volume number, project name, Contractor's name, and date of report.
 - 3. Record report on compact disk.
 - 4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.
- B. Commissioning Report:
 - 1. Include a table of contents and an index to each test.
 - 2. Include major tabs for each Specification Section.
 - 3. Include minor tabs for each test.
 - 4. Within each minor tab, include the following:
 - a. Test specification.
 - b. Pre-startup reports.
 - c. Approved test procedures.
 - d. Test data forms, completed and signed.
 - e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Review preliminary construction checklists and preliminary test procedures and data forms.

3.2 CONSTRUCTION CHECKLISTS

- A. Construction checklists cannot modify or conflict with the Contract Documents.
- B. Create construction checklists based on actual systems and equipment to be included in Project.
- C. Material Checks: Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment, if applicable.
 - 1. Services connection requirements, including configuration, size, location, and other pertinent characteristics.
 - 2. Included optional features.
 - 3. Delivery Receipt Check: Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness and lack of damage.
 - 4. Installation Checks:
 - a. Location according to Drawings and approved Shop Drawings.
 - b. Configuration.
 - c. Compliance with manufacturers' written installation instructions.
 - d. Attachment to structure.
 - e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
 - f. Utility connections are of the correct characteristics, as applicable.
 - g. Correct labeling and identification.
 - h. Startup Checks: Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.
- D. Startup: Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, minimum.
- E. Performance Tests:
 - 1. Static Tests: As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.
 - 2. Component Performance Tests: Tests evaluate the performance of an input or output of components under a full range of operating conditions.
 - 3. Equipment and Assembly Performance Tests: Test and evaluate performance of equipment and assemblies under a full range of operating conditions and loads.
 - 4. System Performance Tests: Test and evaluate performance of systems under a full range of operating conditions and loads.
 - 5. Intersystem Performance Tests: Test and evaluate the interface of different systems under a full range of operating conditions and loads.

- F. Deferred Construction Checklists: Obtain Owner approval of proposed deferral of construction checklists, including proposed schedule of completion of each deferred construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, deferred construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:
1. Identify deferred construction checklists by number and title.
 2. Provide a target schedule for completion of deferred construction checklists.
 3. Written approval of proposed deferred construction checklists, including approved schedule of completion of each deferred construction checklist.
- G. Delayed Construction Checklists: Obtain Owner approval of proposed delayed construction checklists, including proposed schedule of completion of each delayed construction checklist, before submitting request for Certificate of Construction Phase Commissioning Completion. When approved, delayed construction checklists may be completed after date of Construction Phase Commissioning Completion. Include the following in request for Certificate of Construction Phase Commissioning Completion:
1. Identify delayed construction checklist by construction checklist number and title.
 2. Provide a target schedule for completion of delayed construction checklists.
 3. Written approval of proposed delayed construction checklists, including approved schedule of completion of each delayed construction checklist.

3.3 GENERAL EXECUTION REQUIREMENTS

- A. Schedule and coordinate commissioning with the construction schedule.
- B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.
- C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies. In some instances, demonstration of a random sample of other than 100 percent of the results of a test is specified.
1. Where sampling is specified, the sampling plan and procedure for the test demonstration shall be determined using ASQ Z1.4.
 - a. General Inspection: Level I.
 - b. Special Inspection: Level S-1.
 - c. Acceptance Quality Limit (AQL) of 1.5.
 2. The "lot size" in ASQ Z1.4 is the sum of the number of items to which the test demonstration applies, as described in the scope subparagraph of each test.
 3. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
 4. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.

- D. Report test data and commissioning issue resolutions.
- E. Schedule personnel to participate in and perform Commissioning-Process Work.
- F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:
 - 1. Operating the equipment and systems they install during tests.
 - 2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

3.4 CONTRACTOR'S RESPONSIBILITIES

- A. Management and Coordination: Manage, schedule, and coordinate commissioning, including, but not limited to, the following:
 - 1. Coordinate with subcontractors on their commissioning responsibilities and activities.
 - 2. Obtain, assemble, and submit commissioning documentation.
 - 3. Conduct periodic on-site commissioning meetings. Comply with requirements in Section 01 31 00 "Project Management and Coordination."
 - 4. Develop and maintain the commissioning schedule. Integrate commissioning schedule into the construction schedule. Update schedule at specified intervals.
 - 5. Review and comment on preliminary test procedures and data forms.
 - 6. Report inconsistencies and issues in system operations.
 - 7. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
 - 8. Direct and coordinate test demonstrations.
 - 9. Coordinate witnessing of test demonstrations by Owner's witness.
 - 10. Coordinate and manage training. Be present during training sessions to direct video recording, present training and direct the training presentations of others. Comply with requirements in Section 01 79 00 "Demonstration and Training."
 - 11. Prepare and submit specified commissioning reports.
 - 12. Track commissioning issues until resolution and retesting is successfully completed.
 - 13. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide access by Owner to these records on request.
 - 14. Assemble and submit commissioning report.

3.5 COMMISSIONING TESTING

- A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.
- B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with

Contractor's published commissioning schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning.

C. Construction Checklists:

1. Complete construction checklists as Work is completed.
2. Distribute construction checklists to installing contractors before they start work.
3. Installers:
 - a. Verify installation using approved construction checklists as Work proceeds.
 - b. Complete and sign construction checklists weekly for work performed during the preceding week.
4. Provide Commissioning Authority access to construction checklists.

D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.

F. Test Procedures and Test Data Forms:

1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
3. Completed test data forms are the official records of the results of tests.
4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
5. Review preliminary test procedures and test data forms and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:
 - a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
 - b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.

6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."
7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.

G. Performance of Tests:

1. The sampling rate for tests is 100 percent. The sampling rate for test demonstrations is 100 percent unless otherwise indicated.
2. Perform and complete each step of the approved test procedures in the order listed.
3. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
5. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.

H. Performance of Test Demonstration:

1. Perform test demonstrations on a sample of tests after test data submittals are approved. The sampling rate for test demonstrations shall be 100 percent unless otherwise indicated in the individual test specification.
2. Notify Owner's witness at least three days in advance of each test demonstration.
3. Perform and complete each step of the approved test procedures in the order listed.
4. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.
5. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
6. Test demonstration data forms not signed by Contractor and Owner's witness at the time of the completion of the procedure will be rejected. Test demonstrations for which data forms are rejected shall be repeated and results shall be resubmitted.
 - a. Exception for Failure of Owner's Witness to Attend: Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test. On completion, Contractor shall sign the data form for Contractor and for Owner's witness, and shall note the absence of Owner's witness at the scheduled time and place.

7. False load test requirements are specified in related sections.
 - a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.

I. Deferred Tests:

1. Deferred Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction Phase Commissioning Completion as follows:
 - a. Identify deferred tests by number and title.
 - b. Provide a target schedule for completion of deferred tests.
2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

J. Delayed Tests:

1. Delayed Tests List: Identify, in the request for Certificate of Construction Phase Commissioning Completion, proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction Phase Commissioning Completion. Include the following in the request for Certificate of Construction Phase Commissioning Completion:
 - a. Identify delayed tests by test number and title.
 - b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.
2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.
3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

K. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.
4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:
 - a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
 - b. Submit commissioning compliance issue report form within 24 hours of the test.
 - c. Determine the cause of the failure.
 - d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.
5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.
 - a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
 - b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
 - c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
 - d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.
6. Diagnose and correct failed test demonstrations as follows:
 - a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
 - b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
 - c. Record the results of each step of the diagnostic procedure.
 - d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
 - e. Determine and record corrective measures.

- f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.
- 7. Retest:
 - a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.
 - b. For each repeated test demonstration, submit a new test data form, marked "Retest."
- 8. Do not correct commissioning compliance issues during test demonstrations.
 - a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than **five** minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

3.6 SEQUENCING

- A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:
 - 1. Construction Checklists:
 - a. Material checks.
 - b. Installation checks.
 - c. Start up, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
 - d. Performance Tests:
 - 1) Static tests, as appropriate.
 - 2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
 - 3) Equipment and assembly performance tests.
 - 4) System performance tests.
 - 5) Intersystem performance tests.
 - 2. Commissioning tests.

- B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.
- C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.
- D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

3.7 SCHEDULING

- A. Commence commissioning as early in the construction period as possible.
- B. Commissioning Schedule: Integrate commissioning into Contractor's construction schedule. See Section 01 32 00 "Construction Progress Documentation."
 - 1. Include detailed commissioning activities in monthly updated Contractor's construction schedule and short interval schedule submittals.
 - 2. Schedule the start date and duration for the following commissioning activities:
 - a. Submittals.
 - b. Preliminary operation and maintenance manual submittals.
 - c. Installation checks.
 - d. Startup, where required.
 - e. Performance tests.
 - f. Performance test demonstrations.
 - g. Commissioning tests.
 - h. Commissioning test demonstrations.
 - 3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.
 - 4. Determine milestones and prerequisites for commissioning. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short interval schedule submittals.
- C. Two-Week Look-Ahead Commissioning Schedule:
 - 1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning.
 - 2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
 - 3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.

D. Owner's Witness Coordination:

1. Coordinate Owner's witness participation via Architect.
2. Notify Architect of commissioning schedule changes at least **two** work days in advance for activities requiring the participation of Owner's witness.

3.8 COMMISSIONING REPORTS

A. Test Reports:

1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:
 - a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.
 - b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
 - c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
 - d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
 - e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.
2. Test data reports include the following:
 - a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
 - b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
 - c. Signatures of individuals performing and witnessing tests.
 - d. Data trend logs accumulated overnight from the previous day of testing.
3. Commissioning Compliance Issues Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved

by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:

- a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
 - b. Action distribution list.
 - c. Report date.
 - d. Test number and description.
 - e. Equipment identification and location.
 - f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
 - g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
 - h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).
 - i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
 - j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
 - k. Schedule for retesting.
4. Weekly progress reports include information for tests conducted since the preceding report and the following:
- a. Completed data forms.
 - b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
 - c. Activities scheduled but not conducted per schedule.
 - d. Commissioning compliance issue report log.
 - e. Schedule changes for remaining Commissioning-Process Work, if any.
5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.
- a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.
 - b. Attach to the data form printed trend log data collected during the test or test demonstration.
 - c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.

6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."
 - a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

3.9 CERTIFICATE OF CONSTRUCTION PHASE COMMISSIONING COMPLETION

- A. When Contractor considers that construction phase commissioning, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority through Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to compete commissioning.
- B. On receipt of Contractor's list, Commissioning Authority will make an inspection to determine whether the construction phase commissioning or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on Contractor's list, which is not sufficiently complete as defined in "Construction Phase Commissioning Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction Phase Completion, complete or correct such items on notification by Commissioning Authority. In such case, Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction phase commissioning completion.
- C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's and Commissioning Authority's services and expenses made necessary thereby, shall be at Contractor's expense.
- D. When construction phase commissioning or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction Phase Commissioning that shall establish the date of completion of construction phase commissioning. Certificate of Construction Phase Commissioning Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

END OF SECTION

SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.3 PREINSTALLATION MEETINGS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Engineering Survey: Submit engineering survey of condition of building.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for dust control. Indicate proposed locations and construction of barriers.
- C. Schedule of selective demolition activities with starting and ending dates for each activity.
- D. Pre-demolition photographs or video.

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. 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.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- C. Inventory and record the condition of items to be removed and salvaged.

3.2 PREPARATION

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

3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off 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 on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - c. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - d. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - e. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.

3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.5 SELECTIVE DEMOLITION

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
 - 2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 3. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - 4. Dispose of demolished items and materials promptly. Comply with requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
 - 1. Clean salvaged items.
 - 2. Pack or crate items after cleaning. Identify contents of containers.
 - 3. Store items in a secure area until delivery to Owner.
 - 4. Transport items to Owner's storage area designated by Owner.
 - 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
 - 1. Clean and repair items to functional condition adequate for intended reuse.
 - 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - 3. Protect items from damage during transport and storage.
 - 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and

cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.6 CLEANING

- A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction and recycle or dispose of them according to Section 01 74 19 "Construction Waste Management and Disposal."
 - 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 01 74 19 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 03 35 43 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes polished concrete finishing, including staining.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of product requiring color selection.

1.3 QUALITY ASSURANCE

- A. Field Sample Panels: After approval of samples, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.
 - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
 - 2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Demolish and remove field sample panels when directed.

PART 2 - PRODUCTS

2.1 STAIN MATERIALS

- A. Reactive Stain: Acidic-based stain with wetting agents and high-grade, UV-stable metallic salts that react with calcium hydroxide in cured concrete to produce permanent, variegated, or translucent color effects.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Americrete, Inc.; A-8000 Reactive Stains.
 - b. Artcrete, Inc.; Faux Brick Concrete Stain.
 - c. Bomanite Corporation; Chemical Stain.
 - d. Bon Tool Co.; True Etch Acid Stain.
 - e. Brickform; Blush-Tone Acid Stain.
 - f. Butterfield Color; Perma-Cast Sierra Stain.

- g. Decosup Inc.; ChemTone Masonry Reactive Stain.
 - h. H&C Concrete Care Products; Infusion Reactive Concrete Stain.
 - i. QC Construction Products; QC Patina Stain.
 - j. Scofield, L. M. Company; Lithochrome Chemstain Classic.
 - k. Specialty Concrete Products, Inc.; CHROME-ETCH Acid Stain.
 - l. Stampcrete International Ltd.; Patina Stain.
 - m. SuperStone, Inc.; ChlorStain.
 - n. SureCrete Design Products; SureStain.
 2. Stains shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Americrete, Inc.; A-2050 Enviro Stain.
 - b. Bomanite Corporation; Con-Color.
 - c. Bon Tool Co.; Water Based Concrete Stain.
 - d. Brickform; Freestyle Solid-Color Stain.
 - e. Butterfield Color; Water Based Concrete Stain.
 - f. Duckback Products; DB6000 Mason's Select Transparent Concrete Stain.
 - g. H&C Concrete Care Products; Shield Plus Ultra Concrete Stain.
 - h. Scofield, L. M. Company; Lithochrome Tintura Stain.
 - i. SuperStone, Inc.; Hydro-Tone.
 2. Stains shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. ARDEX GmbH.
 2. Liquid floor treatments shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 POLISHING

- A. Polish: Level 3: High sheen, 800 grit.
- B. Apply polished concrete finish system to cured and prepared slabs.
 - 1. Machine grind floor surfaces to receive polished finishes level and smooth.
 - 2. Apply reactive stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
 - 3. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 - 4. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
 - 5. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
 - 6. Control and dispose of waste products produced by grinding and polishing operations.
 - 7. Neutralize and clean polished floor surfaces.

3.2 STAINING

- A. Newly placed concrete shall be at least 30 days old before staining.
- B. Prepare surfaces according to manufacturer's written instructions and as follows:
 - 1. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure washing, or scrubbing with a rotary floor machine and detergents recommended by stain manufacturer. Rinse until water is clear and allow surface to dry.
 - a. Do not use acidic solutions to clean surfaces.
 - 2. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates only in some areas, profile surfaces by grinding, sanding, or abrasive blasting. Retest and continue profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.
 - 3. Apply acidic solution to dampened concrete surfaces, scrubbing with uncolored, acid-resistant nylon-bristle brushes until bubbling stops and concrete surface has texture of 120-grit sandpaper. Do not allow solution to dry on concrete surfaces. Rinse until water is clear. Control, collect, and legally dispose of runoff.
 - 4. Neutralize concrete surfaces and rinse until water is clear. Test surface for residue with clean white cloth. Test surface according to ASTM F 710 to ensure pH is between 7 and 8.
- C. Allow concrete surface to dry before applying stain. Verify readiness of concrete to receive stain according to ASTM D 4263 by tightly taping 18-by-18-inch, 4-mil-

thick polyethylene sheet to a representative area of concrete surface. Apply stain only if no evidence of moisture has accumulated under sheet after 16 hours.

- D. Reactive Stain: Apply reactive stain to concrete surfaces according to manufacturer's written instructions and as follows:
1. Apply stain by uncolored bristle brush, roller, or high-volume, low-pressure sprayer and immediately scrub into concrete surface with uncolored, acid-resistant nylon-bristle brushes in continuous, circular motion. Do not spread stain after fizzing stops. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
 2. Remove stain residue after four hours by wet scrubbing with commercial-grade detergent recommended by stain manufacturer. Rinse until water is clear. Control, collect, and legally dispose of runoff.
- E. Penetrating Stain: Apply penetrating stain to concrete surfaces according to manufacturer's written instructions and as follows:
1. Apply first coat of stain to dry, clean surfaces by airless sprayer or by high-volume, low-pressure sprayer.
 2. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
 3. Rinse until water is clear. Control, collect, and legally dispose of runoff.

END OF SECTION

SECTION 03 49 00 - GLASS-FIBER-REINFORCED CONCRETE (GFRC)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes glass-fiber-reinforced concrete (GFRC) thin wall units.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include GFRC design mixes.
- B. Shop Drawings: Show fabrication and installation details for GFRC panels including the following:
 - 1. Panel elevations, sections, and dimensions.
 - 2. Thickness of facing mix, GFRC backing, and bonding pads for typical panels.
 - 3. Finishes.
 - 4. Joint and connection details.
 - 5. Erection details.
 - 6. Panel frame details for typical panels including sizes, spacings, thicknesses, and yield strengths of various members.
 - 7. Locations and details of connection hardware attached to structure.
 - 8. Sizes, locations, and details of flex, gravity, and seismic anchors for typical panels.
 - 9. Other items sprayed into panels.
 - 10. Erection sequence for special conditions.
 - 11. Relationship to adjacent materials.
 - 12. Description of loose, cast-in, and field hardware.
- C. Samples for Verification: Representative of finish, color, and texture variations expected, approximately 12 by 12 inches by actual thickness.
- D. Delegated-Design Submittal: For GFRC panels, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification data.
- B. Welding certificates.
- C. Source quality-control program.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Designated a PCI-certified plant for Group G - Glass Fiber Reinforced Concrete or designated an APA-certified plant for GFRC production.
- B. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Handle and transport GFRC panels supported on nonstaining material and with nonstaining resilient spacers between panels.
- B. Store GFRC panels off of ground on firm, level, and smooth surfaces supported on nonstaining material and with nonstaining resilient spacers between panels. Place stored panels so identification marks are clearly visible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain GFRC panels from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design GFRC panels, including panel frames, anchors, and connections.
- B. Structural Performance: GFRC panels, including panel frames, anchors, and connections, shall withstand the following design loads as well as the effects of thermal- and moisture-induced dimensional changes within limits and under conditions indicated:
 - 1. Loads: As indicated.
- C. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
 - 1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."

- D. AISI Specifications: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. AISC Specifications: Comply with AISC 360, "Specification for Structural Steel Buildings."

2.3 GFRC MATERIALS

- A. Portland Cement: ASTM C 150/C 150M; Type I, II, or III.
 - 1. For surfaces exposed to view in finished structure, use white of same type, brand, and source throughout GFRC production.
- B. Metakaolin: ASTM C 618, Class N.
- C. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches long, specifically produced for use in GFRC, and complying with ASTM C 1666/C 1666M.
- D. Sand: Washed and dried silica, complying with composition requirements in ASTM C 144; passing a No. 20 sieve with a maximum of 2 percent passing a No. 100 sieve.
- E. Facing Aggregate: ASTM C 33/C 33M, except for gradation, and PCI MNL 130, 1/8-inch maximum size.
- F. Coloring Admixture: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
- G. Water: Potable; complying with chemical limits in PCI MNL 130.
- H. Polymer-Curing Admixture: Acrylic thermoplastic copolymer dispersion complying with PCI MNL 130.
- I. Air-Entraining Admixture: ASTM C 260/C 260M, containing not more than 0.1 percent chloride ions.
- J. Chemical Admixtures: ASTM C 494/C 494M, containing not more than 0.1 percent chloride ions.

2.4 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS

- A. Bolts: ASTM A 307 or ASTM A 325.

2.5 PANEL FRAME MATERIALS

- A. Cold-Formed Steel Framing: Manufacturer's standard C-shaped steel studs, complying with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members," with minimum uncoated steel thickness of 0.053 inch.
- B. Hollow Structural Sections: Steel tubing, ASTM A 500/A 500M, Grade B, or ASTM A 513.
- C. Steel Channels and Angles: ASTM A 36/A 36M.

2.6 GFRC MIXES

- A. Mist Coat: Portland cement, sand slurry, and admixtures; of same proportions as backing mix without glass fibers.
- B. Face Mix: Proportion face mix of portland cement, sand, facing aggregates, and admixtures to comply with design requirements.
- C. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.

2.7 PANEL FRAME FABRICATION

- A. Fabricate panel frames and accessories plumb, square, true to line, and with components securely fastened.
 - 1. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3/D1.3M.
 - 2. Fasten framing members of hollow structural sections, steel channels, or steel angles by welding. Comply with AWS D1.1/D1.1M.
 - 3. Weld anchors to panel frames.
- B. Reinforce framing assemblies, as necessary, to withstand erection stresses.

2.8 GFRC FABRICATION

- A. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.
- B. Spray Application: Comply with general procedures as follows:
 - 1. Spray mist coat over molds to a nominal thickness of 1/8 inch on planar surfaces.
 - 2. Spray or place face mix in thickness indicated on Shop Drawings.
 - 3. Proceed with spraying backing mix before face mix has set, using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.

4. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.
 5. Measure thickness with a pin gage or other acceptable method at least once for every 5 sq. ft. of panel surface. Take no fewer than six measurements per panel.
- C. Hand form and consolidate intricate details, incorporate formers or infill materials, and overspray before material reaches initial set to ensure complete bonding.
 - D. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of 1/2 inch from GFRC backing, and without anchors protruding into GFRC backing.
 - E. Build up homogeneous GFRC bonding pads over anchor feet, maintaining a minimum thickness of 1/2 inch over tops of anchor feet, before initial set of GFRC backing. Measure bonding pad thickness at 25 percent of anchor locations.
 - F. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide enough anchorage and embedment to comply with design requirements.
 - G. Curing: Employ initial curing method that ensures sufficient strength for removing units from mold. Comply with PCI MNL 130 procedures.
 - H. GFRC Finish: Board form as cast in form liner.

2.9 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130.

PART 3 - EXECUTION

3.1 ERECTION

- A. Install clips, hangers, and other accessories required for connecting GFRC panels to supporting members and backup materials.
- B. Install GFRC panels level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
 1. Maintain horizontal and vertical joint alignment and uniform joint width.
 2. Remove projecting hoisting devices.
- C. Connect GFRC panels in position by bolting, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.

- D. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.
- E. Erect GFRC panels to comply with PCI MNL 130 recommendations.

3.2 REPAIRS

- A. Repairs are permitted provided structural adequacy of GFRC panel and appearance are not impaired, as approved by Architect.
- B. Remove and replace damaged GFRC panels when repairs do not comply with requirements.

3.3 CLEANING AND PROTECTION

- A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

END OF SECTION

SECTION 03 54 16 - HYDRAULIC CEMENT UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes polymer-modified, self-leveling, hydraulic cement underlayment for application below interior floor coverings.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.

- 1. Place hydraulic cement underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

PART 2 - PRODUCTS

2.1 HYDRAULIC CEMENT UNDERLAYMENTS

- A. Hydraulic Cement Underlayment: Polymer-modified, self-leveling, hydraulic cement product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.

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

- a. Ardex: K-15 Self-Leveling Underlayment Concrete.
 - b. BASF Construction Chemicals, Inc.; MBT Mastertop 110 Plus Underlayment.
 - c. Bonsal American, an Oldcastle company; ProSpec Level Set 200 MAPEI Corporation; Ultraplan Easy.
 - d. TEC, H.B. Fuller company; TEC Smooth Start.

2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 3. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.
 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- B. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- C. Water: Potable and at a temperature of not more than 70 deg F.
- D. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- E. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
1. VOC Content: Provide primer with VOC content of 200 g/L.
 2. Low-Emitting Primer: Primer shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. Surface Sealer: Designed to reduce porosity as recommended by manufacturer for type of floor covering to be applied to underlayment.

PART 3 - EXECUTION

3.1 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
1. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- C. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
 - 1. Install underlayment reinforcement recommended in writing by manufacturer.
- D. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- E. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.2 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum adhesion to substrate and between coats.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface.
 - 1. Apply a final layer without aggregate to product surface.
 - 2. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- F. Apply surface sealer at rate recommended by manufacturer.
- G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

END OF SECTION

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.

1.3 INFORMATIONAL SUBMITTALS

A. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

- B. Qualification Data: For testing agency.

- C. Welding certificates.

- D. Product test reports.

- E. Research reports.

1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency.

- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

- C. Comply with AISI S230 "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. AllSteel & Gypsum Products, Inc.
2. ClarkDietrich Building Systems, Inc.
3. Consolidated Fabricators Corp.; Building Products Division.
4. Craco Mfg., Inc.
5. Formetal Co. Inc. (The).
6. Nuconsteel; a Nucor Company.
7. Steel Construction Systems.
8. Steel Network, Inc. (The).
9. Telling Industries, LLC.
10. United Metal Products, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As determined by Engineer of Delegated Design to support weight of finishes..
 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft..
 3. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 3/4 inch.
- C. Cold-Formed Steel Framing Design Standards:
1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211.
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.
- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 1. Grade: As required by structural performance.
 2. Coating: G60, A60, AZ50, or GF30.
- C. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 1. Grade: As required by structural performance.
 2. Coating: G60 (.

2.4 LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0428 inch.
 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and matching minimum base-metal thickness of steel studs.
- C. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: 0.0329 inch.
 2. Flange Width: 1-5/8 inches.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 36 or Grade 55, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107/C 1107M, with fluid consistency and 30-minute working time.
- D. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch () thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch () to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths.
- E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet () and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch () from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - 1. Anchor Spacing: As shown on Shop Drawings.
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch () between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- F. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- G. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - 1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 - 2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - 1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- I. Install horizontal bridging in stud system, spaced vertically as indicated on Shop Drawings. Fasten at each stud intersection.
 - 1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of two screws into each flange of the clip angle for framing members up to 6 inches () deep.
 - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs.

Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

3. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

- J. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
- K. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Shelf angles.
3. Miscellaneous steel trim.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Paint products.
2. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design ladders.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. 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.
- F. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- H. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 coating; 0.079-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B
- I. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
- J. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 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. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
- D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches 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.

2.4 MISCELLANEOUS MATERIALS

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Shop Primers: Provide primers that comply with Section 09 91 23 Interior Painting."
- C. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- C. Weld corners and seams continuously to comply with the following:
 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches from ends and corners of units and 24 inches o.c.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - 1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

2.9 LOOSE BEARING AND LEVELING PLATES

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

2.10 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.

2.11 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

2.12 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items 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 Section 09 91 23 "Interior Painting" indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with non-shrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 05 70 00 - DECORATIVE METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Decorative mechanical grilles and frames.
2. Custom door pulls.
3. Combination hall push-button stations.

B. Related Requirements:

1. Section 05 75 00 "Decorative Formed Metal" for decorative metal items made from sheet metal.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative metal.
1. Indicate materials, finishes, fasteners, anchorages, and accessory items.
- C. Patterns, Models, or Plaster Castings: For each custom casting required.
- D. Samples: For each type of exposed finish.

PART 2 - PRODUCTS

2.1 ALUMINUM

- A. Fabricate products from alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
- B. Bars and Shapes: ASTM B 221 (ASTM B 221M), Alloy 6063-T5/T52.
- C. Tubing: ASTM B 210 (ASTM B 210M), Alloy 6063-T832.
- D. Plate and Sheet: ASTM B 209 (ASTM B 209M).

2.2 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
- C. Bars and Shapes: ASTM A 276, Type 304.

2.3 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/A 500M (cold formed).
- C. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.
- E. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

2.4 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
 - 1. Aluminum Items: Type 304 stainless-steel fasteners.
 - 2. Stainless-Steel Items: Type 304 stainless-steel fasteners.
 - 3. Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 304 stainless-steel fasteners where exposed.
 - 4. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Low-Emitting Paints and Coatings: Paints and coatings applied to interior decorative metal items shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Shop Primers: Provide primers that comply with Section 09 91 23 "Interior Painting."
- E. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- F. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

2.6 FABRICATION, GENERAL

- A. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
- B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
- C. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - 1. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

2.7 COMBINATION HALL PUSH-BUTTON STATIONS

- A. Fabricate units of stainless steel to comply with details indicated. Coordinate with elevator signal equipment to provide integrated, closely fitted assemblies.
 - 1. Fabricate faceplates from 1/8-inch- (3.2-mm-) thick sheet with edges beveled at a 45-degree angle for one-half thickness of metal.
 - 2. Provide units with emergency pictorial signs and text, complying with requirements of authorities having jurisdiction, indicating that in fire emergency, elevators should not be used and that stairways should be used

instead. Engrave pictorial sign and text into front surface of faceplates to a depth of 1/16 inch (1.6 mm) with engraving painted red.

3. Provide cutouts in faceplates of units for push buttons of elevator hall push-button station and elevator key switches.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.9 ALUMINUM FINISHES

2.10 STAINLESS-STEEL FINISHES

- A. Directional Satin Finish: No. 4.

2.11 STEEL AND IRON FINISHES

- A. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- B. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 1. Shop prime uncoated ferrous-metal surfaces with primers specified in Section 09 91 23 "Interior Painting."
 2. Do not apply primer to galvanized surfaces.
- C. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
 1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
 3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
 4. Color: As selected by Architect from manufacturer's full range.
- D. Powder-Coat Finish: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
 1. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.

2. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
4. Color: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
- B. Set products accurately in location, alignment, and elevation, measured from established lines and levels.
- C. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers.
- D. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- E. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
- F. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work.
- G. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 1. 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.

END OF SECTION

SECTION 05 75 00 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

- 1.
2. Closures and trim.
3. Filler panels at demountable partitions and between dissimilar construction.
4. Metal base.

B. Related Requirements:

1. Section 05 70 00 "Decorative Metal" for decorative items made primarily from plate, bars, extrusions, tubes, castings, and other forms of metal, but which may include sheet metal components.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Show fabrication and installation details for decorative formed metal.

1. Include plans, elevations, component details, and attachment details.
2. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.

C. Samples: For each type of exposed finish required, prepared on 6-inch- square Samples of metal of same thickness and material indicated for the Work.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.

B. Evaluation Reports: For post-installed anchors, from ICC-ES.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. General: Fabricate products from sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- C. Aluminum Sheet: Flat sheet complying with ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties of not less than Alloy 5005-H32.
- D. Steel Sheet: electrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
- E. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness.

2.2 MISCELLANEOUS MATERIALS

- A. Sealants, Interior: Non-sag, paintable, non-staining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.
 - 1. Sealants shall have a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Sealants shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as necessary for strength, corrosion resistance, and compatibility in fabricated items.
 - 1. Use filler metals that will match the color of metal being joined.
- C. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated.
 - 1. Provide square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors: Provide fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
- E. Anchor Materials:

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.
- F. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and is noncombustible after curing.
1. Metal-to-Metal Adhesive: VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.3 PAINTS AND COATINGS

- A. Low-Emitting Materials: Paints and coatings applied to interior decorative formed metal items shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Shop Primers: Comply with Section 09 91 23 "Interior Painting."
- C. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

2.4 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble decorative formed metal items in 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.
- B. Fold back exposed edges of unsupported sheet metal to form a 1/2-inch- wide hem on the concealed side, or ease edges to a radius of approximately 1/32 inch and support with concealed stiffeners.
- C. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness and sufficient strength for indicated use.
1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.

- D. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.

2.5 CLOSURES AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by[one of] the following:
 - 1. Fry Reglet Corporation.
 - 2. Pittcon Industries.
- B. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
 - 1. Aluminum Sheet: 0.063 inch.
 - a. Finish: Mill.
 - 2. Steel Sheet: 0.048 inch.
 - a. Finish: Factory primed.

2.6 FILLER PANELS

- A. Form from two sheets of metal of type and thickness indicated below, separated by channels formed from the same material, producing a panel of same thickness as mullions unless otherwise indicated. Incorporate reveals, trim, and concealed anchorages for attaching to adjacent surfaces.
 - 1. Galvanized-Steel Sheet: 0.064 inch.
 - a. Finish: Factory primed.
 - 2. Steel Sheet: 0.060 inch.
 - a. Finish: Factory primed.
- B. Fill interior of panel with sound-deadening insulation permanently attached to inside panel faces.
- C. Adhesively attach gaskets to filler panel edges where they abut mullions or glazing.

2.7 METAL BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Fry Reglet Corporation.
 - 2. Pittcon Industries.

- B. Form metal base from metal of type and thickness indicated below:

1. Stainless-Steel Sheet: 0.050 inch.

- a. Finish: No. 4.

2.8 ALUMINUM FINISHES

- A. 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.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.9 STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."

- B. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating.

- C. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items 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.

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

1. Color and Gloss: As selected by Architect from manufacturer's full range.

- E. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.10 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.
- C. Directional Satin Finish: No. 4.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- E. When finishing with Patina see scheduled Manufacturer's instructions.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
- E. Install decorative-formed-metal-clad doors and frames to comply with requirements specified in Section 08 11 13 "Hollow Metal Doors and Frames."
- F. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

END OF SECTION

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers.
 - 2. Wood furring.
 - 3. Plywood backing panels.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Regional Materials: The following wood materials 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:
 - 1. Dimension lumber.
- B. Certified Wood: The following wood materials shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
 - 1. Dimension lumber.

- C. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Dress lumber, S4S, unless otherwise indicated.
- D. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less; 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 2. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings, and the following:
 - 1. Concealed blocking.
 - 2. Framing for non-load-bearing partitions.
 - 3. Plywood backing panels.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.

3. Furring.
4. Grounds.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

C. Concealed Boards: 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine or southern pine; No. 2 grade; SPIB.
2. Eastern softwoods; No. 2 Common grade; NeLMA.

2.4 PLYWOOD BACKING PANELS

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

1. Plywood shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.5 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or as appropriate for the substrate.

2.6 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, provide products 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, as published by manufacturer, shall meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.

- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

- 1. Use for interior locations unless otherwise indicated.

2.7 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- C. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less.
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Do not splice structural members between supports unless otherwise indicated.
- F. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code (IBC).
2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

3.2 PROTECTION

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

END OF SECTION

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior trim.
 - 2. Shelving.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Regional Materials: The following wood 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.
 - 1. Interior trim.
 - 2. Interior paneling.
 - 3. Shelving.
- B. Certified Wood: The following wood products shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - 1. Interior trim.
 - 2. Shelving.
- C. Low-Emitting Materials: Composite wood products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Lumber: DOC PS 20.
 - 1. Factory mark each piece of lumber with grade stamp of inspection agency indicating grade, species, moisture content at time of surfacing, and mill.

- a. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- E. Softwood Plywood: DOC PS 1.
- F. Hardboard: AHA A135.4.
- G. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
- H. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea-formaldehyde resin.
- I. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
 - 1. Color: White.

2.2 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent respectively.
- B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber and plywood indicated to receive a stained or natural finish, mark back of each piece.
- C. Application: All interior lumber and plywood.

2.3 INTERIOR TRIM

- A. Softwood Lumber Trim:
 - 1. Species and Grade: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; Premium or 2 Common (Sterling); NeLMA, NLGA, or WWPA.
 - 2. Species and Grade: Douglas fir-larch or Douglas fir south, Superior or C & Btr finish; NLGA, WCLIB, or WWPA.
 - 3. Species and Grade: Southern pine, B & B finish; SPIB.
 - 4. Maximum Moisture Content: 15 percent.

B. Hardwood Lumber Trim:

1. Species and Grade: Aspen, basswood, cottonwood, sap gum, sycamore, white maple, or yellow poplar; Clear; NHLA.
2. Maximum Moisture Content: 9 percent.

2.4 PANELING

2.5 SHELVING AND CLOTHES RODS

- A. Shelving: Made from one of the following materials, 3/4 inch thick.
 1. MDF with solid-wood front edge.
 2. MDO softwood plywood with solid-wood edge.
 3. Melamine-faced particleboard with applied-PVC front edge.
- B. Shelf Cleats: 3/4-by-3-1/2-inch boards, as specified above for lumber trim.
- C. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.

2.6 MISCELLANEOUS MATERIALS

- A. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL

- A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
3. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
4. Install stairs with no more than 3/16-inch variation between adjacent treads and risers and with no more than 3/8-inch variation between largest and smallest treads and risers within each flight.

3.3 STANDING AND RUNNING TRIM INSTALLATION

- A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

3.4 SHELVING AND CLOTHES ROD INSTALLATION

- A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.
- B. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than 16 inches o.c.
- C. Install shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- D. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.

END OF SECTION

SECTION 06 41 16 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets unless concealed within other construction before cabinet installation.

B. Related Requirements:

1. Section 12 36 23.13 "Plastic-Laminate-Clad Countertops."

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, adhesive for bonding plastic laminate, fire-retardant-treated materials, and cabinet hardware and accessories.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Plastic laminates, for each color, pattern, and surface finish.
2. Thermoset decorative panels, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.

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

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural plastic-laminate cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. Provide certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.
- B. Grade: Premium.
- C. Type of Construction: Face frame.
- D. Cabinet, Door, and Drawer Front Interface Style: Flush overlay and reveal overlay as indicated..
- E. Reveal Dimension As indicated.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
 - 1. Manufacturers: Subject to compliance with requirements, provide products as indicated in drawings.
- G. Laminate Cladding for Exposed Surfaces:
 - 1. Horizontal Surfaces: Grade HGS.
 - 2. Postformed Surfaces: Grade HGP.
 - 3. Vertical Surfaces: Grade VGS.
 - 4. Pattern Direction: As indicated.
- H. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS
 - 2. Drawer Sides and Backs: Solid-hardwood lumber.
 - 3. Drawer Bottoms: Hardwood plywood.
- I. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

- J. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Match Architect's sample.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than <25 percent.
 - 2. Composite Wood and Agrifiber Products: 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."
 - 3. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
 - 4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
 - 5. Softwood Plywood: DOC PS 1, medium-density overlay.
 - 6. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
 - 7. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 - 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant

progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
 1. Grass America; G393.
 2. Salice; Series 200.
 3. Blum; Clip Top Press-In 71T6580
- B. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- C. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
 1. Knappe and Vogt (drilled side supports) BHMA A156.9, B04013; metal:
 - a. Shelf Rests: 333 or 346 supports.
- D. Drawer Slides: BHMA A156.9.
 1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 3. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches high and 24 inches wide.
 - a. Accuride 7432.
 4. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches high or 24 inches wide.
 - a. Accuride 4034.
 5. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches high and 24 inches wide.
 - a. Sidewall mount 100 lb./45 kg.: Accuride 3832.
 - b. Top mount 45 lb./20 kg.: Accuride 2006.
 6. Keyboard Slides: Grade 1HD-100; for computer keyboard shelves.

7. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches high and 16 inches wide.

E.

- F. Door Locks: BHMA A156.11, E07121.

1. Corbin: 0737 lock with 12-S and 2540 strikes.
2. Yale: 9780 lock with related strikes.

- G. Drawer Locks: BHMA A156.11, E07041.

1. Knappe and Vogt: 986 lock.
2. Timberline Lock, Ltd.: CB-280.

- A. 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.

- B. Toe Kick for ADA Sink Base doors:

1. "Quick Toe" by Moore Technologies, Inc.

- C. Door and Drawer Silencers: BHMA A156.16, L03011.

1. Provide clear rubber self-adhesive mounting type.

- D. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
2. Satin Stainless Steel: BHMA 630.

- E. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: [Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of

Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- E. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.6 FABRICATION

- A. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- C. Install glass to comply with applicable requirements in Section 08 80 00 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings

and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

END OF SECTION

SECTION 06 46 00 - WOOD TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior standing and running trim.
 - 2. Closet and utility shelving.
 - 3. Wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.
 - 4. Shop priming of wood trim.
 - 5. Shop finishing of wood trim.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
 - 2. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.

1.5 FIELD CONDITIONS

- A. Environmental Limitations for Interior Work: Do not deliver or install interior wood trim until building is enclosed, wet work is complete, and HVAC system is operating

and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 WOOD TRIM, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of wood trim indicated for construction, finishes, installation, and other requirements.
 - 1. Provide certificates from AWI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Premium.
- B. Wood Species: Any closed-grain hardwood.

2.3 CLOSET AND UTILITY SHELVING

- A. Grade: Premium.
- B. Shelf Material: 3/4-inch medium-density fiberboard with solid-lumber edge.
- C. Cleats: 3/4-inch solid lumber.
- D. Closet Rods: 1-5/16-inch- diameter, chrome-plated-steel tubes complying with BHMA A156.16, L03131.

2.4 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood trim and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content for Interior Materials: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of wood trim and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
 - 2. Composite Wood and Agrifiber Products: 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."

3. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
4. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
 1. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 1. Kiln dry lumber after treatment to a maximum moisture content of 19 percent.

2.6 MISCELLANEOUS MATERIALS

- A. Interior Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- B. Provide self-drilling screws for metal-framing supports.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- D. Adhesives: Do not use adhesives that contain urea formaldehyde.
- E. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- F. VOC Limits for Installation Adhesives and Sealants: Use products that 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. Structural Wood Member Adhesive: 140 g/L.
4. Architectural Sealants: 250 g/L.

2.7 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate wood trim to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
1. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members except for members with ends exposed in finished work.
- D. Assemble casings in shop except where shipping limitations require field assembly.

2.8 SHOP PRIMING

- A. Interior Wood Trim for Opaque Finish: Shop prime with one coat of wood primer specified in Section 09 91 23 "Interior Painting."
- B. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to each unit of work.
1. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.9 SHOP FINISHING

- A. General: Finish wood trim at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Section 09 91 23 "Interior Painting" for field finishing wood trim not indicated to be shop finished.
- C. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice

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

- D. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to each unit of work.
 - 1. Back-priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to end-grain surfaces.
- E. Transparent Finish for Exterior Trim: Comply with Section 09 93 00 "Staining and Transparent Finishing."
- F. Opaque Finish for Interior Trim:
 - 1. Grade: Premium.
 - 2. Finish: System - 4, water-based latex acrylic.
 - 3. Color: Match Architect's sample.
 - 4. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition wood trim to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install wood trim to comply with same grade as item to be installed.
- B. Install wood trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut wood trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. 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.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.
- F. Anchor wood trim to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

1. For shop-finished items, use filler matching finish of items being installed.
- 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. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

END OF SECTION

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Low-emitting product certification.
- B. Product test reports.
- C. Research reports.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET

- A. 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.
 - 3. Low Emitting: Complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Recycled Content of Insulation: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 35 percent.
- C. Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. CertainTeed Corporation.
- b. Guardian Building Products, Inc.
- c. Johns Manville.
- d. Knauf Insulation.
- e. Owens Corning.

2.2 ACCESSORIES

A. Insulation for Miscellaneous Voids:

- 1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E 84.
- 2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.

B. Insulation Anchors, Spindles, and Standoffs: As recommended by manufacturer.

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

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide ventilation between insulated attic spaces and vented eaves.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

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

3.2 INSTALLATION OF CAVITY-WALL INSULATION

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 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 metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

END OF SECTION

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations in fire-resistance-rated walls.
2. Penetrations in horizontal assemblies.
- 3.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

- ##### B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

1.4 INFORMATIONAL SUBMITTALS

- ##### A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- ##### A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Global in its "Building Materials Approval Guide."

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc.
 - b. 3M Fire Protection Products.
 - c. Tremco, Inc.; Tremco Fire Protection Systems Group.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.

2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- E. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content:
1. Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- F. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- D. Install fill materials by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.3 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

3.5 PENETRATION FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

- The first alpha component is one of three letters

Letter	Construction Penetrated
F	Floor penetrations
W	Wall penetrations
C	Either floor or wall penetrations

- The second alpha component describes the type of construction being penetrated and can include a single letter or dual letters. The construction characterized by each letter is described below, using the wording in UL's Fire Resistance Directory.

Letter	Description
A	Concrete floors with a minimum thickness less than or equal to 5 inches (125 mm)
B	Concrete floors with a minimum thickness greater than 5 inches (125 mm)
C	Framed floors
D	Steel decks in marine vessels
E through I	Not used now
J	Concrete or masonry walls with a minimum thickness less than or equal to 8 inches (200 mm)
K	Concrete or masonry walls with a minimum thickness greater than 8 inches (200 mm)
L	Framed walls
M	Bulkheads in marine vessels
N through Z	Not used now

- The numeric component uses four-digit numbers to identify each system and is within discrete number ranges to identify the type of penetrating items. The number ranges and the types of penetrating items they relate to are explained below.

<i>Number Range</i>	<i>Description</i>
0000-0999	<i>No penetrating items</i>
1000-1999	<i>Metallic pipe, conduit, or tubing</i>
2000-2999	<i>Nonmetallic pipe, conduit, or tubing</i>
3000-3999	<i>Electrical cables</i>
4000-4999	<i>Cable trays with electrical cables</i>
5000-5999	<i>Insulated pipes</i>
6000-6999	<i>Miscellaneous electrical penetrants such as bus ducts</i>
7000-7999	<i>Miscellaneous mechanical penetrants such as air ducts</i>
8000-8999	<i>Groupings of penetrations including any combination of items listed above</i>

END OF SECTION

SECTION 07 84 43 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hilti, Inc.
 - b. 3M Fire Protection Products.
 - c. Tremco, Inc.; Tremco Fire Protection Systems Group.
 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- D. VOC Content: Fire-resistive joint system sealants shall comply with the following limits for VOC content:
 1. Architectural Sealants: 250 g/L.
 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 3. Sealant Primers for Porous Substrates: 775 g/L.
- E. Low-Emitting Materials: Fire-resistive joint system sealants shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

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

3.2 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping 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 - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing agency.

4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.3 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.4 CLEANING AND PROTECTION

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

3.5 JOINT FIRESTOPPING SYSTEM SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- B. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under product category Expansion/Seismic Joints or Firestop Systems.

- *The first two alpha characters used to describe the type of joint system are limited to the following:*

<i>Alpha Characters</i>	<i>Description of Joint System</i>
<i>FF</i>	<i>Floor to Floor</i>
<i>WW</i>	<i>Wall to Wall</i>
<i>FW</i>	<i>Floor to Wall</i>
<i>HW</i>	<i>Head of Wall</i>

- *The third alpha character is separated from the first two by a dash and is limited to one of the following:*

*Alpha Characters**S**D**Movement Capability**No movement capability**Has movement capability*

- *The following number ranges, which are separated from the third alpha character by a dash, describe the nominal joint widths:*

*Number Range**0000-0999**1000-1999**2000-2999**3000-3999**4000-4999**Nominal Joint Width**Less than or equal to 2 inches**Greater than 2 inches and less than or equal to 6 inches**Greater than 6 inches and less than or equal to 12 inches**Greater than 12 inches and less than or equal to 24 inches**Greater than 24 inches*

END OF SECTION

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Nonstaining silicone joint sealants.
 - 2. Urethane joint sealants.
 - 3. Immersible joint sealants.
 - 4. Mildew-resistant joint sealants.
 - 5. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples: For each kind and color of joint sealant required.
- C. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Preconstruction laboratory test reports.
- C. Preconstruction field-adhesion-test reports.
- D. Field-adhesion-test reports.
- E. Sample warranties.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING

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

1.7 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
 - 1. Architectural sealants shall have a VOC content of 250 g/L or less.
 - 2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
- B. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 290 FPS-NB.
 - b. Pecora Corporation; 890FTS/TXTR.
 - c. Tremco Incorporated; Spectrem 1.
- C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 795.
 - b. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 295 FPS NB.
 - c. Pecora Corporation; 864NST.
 - d. Tremco Incorporated; Spectrem 2.
- D. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Dow Corning Corporation; 790.

2.3 IMMERSIBLE JOINT SEALANTS

- A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 1; tested in deionized water unless otherwise indicated
- B. Urethane, Immersible, S, NS, 100/50, NT, I: Immersible, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-

use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, and I.

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

a. Tremco Incorporated; Vulkem 921.

C. Urethane, Immersible, S, NS, 35, NT, I: Immersible, single-component, nonsag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT and I.

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

a. BASF Construction Chemicals, LLC, Building Systems; Sonolastic NP 1.

2.4 MILDEW-RESISTANT JOINT SEALANTS

A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

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

a. Dow Corning Corporation; 786-M White.

b. GE Construction Sealants; SCS1700 Sanitary.

c. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 100 WF.

d. Tremco Incorporated; Tremsil 200.

2.5 JOINT-SEALANT BACKING

A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) , and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

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

a. BASF Construction Chemicals, LLC, Building Systems.

b. Construction Foam Products, a division of Nomaco, Inc.

B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.6 MISCELLANEOUS MATERIALS

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

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.

3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 1. Extent of Testing: Test completed and cured sealant joints as follows:
 - a. Perform one test for each 100 feet¹ of joint length thereafter or one test per each floor per elevation.
 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces[<JS-1>].
 1. Joint Locations:
 - a. Control and expansion joints on exposed interior surfaces of exterior walls.
 - b. Tile control and expansion joints.
 - c. Vertical joints on exposed surfaces of walls and partitions.
 - d. Other joints as indicated on Drawings.
 2. Joint Sealant: Urethane, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement[<JS-2>].
 1. Joint Locations:

- a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints between interior wall surfaces and frames of 2 interior doors, windows, and elevator entrances.
 - c. Other joints as indicated on Drawings.
 2. Joint Sealant: Acrylic latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces[<JS-3>].
1. Joint Locations:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Other joints as indicated on Drawings.
 2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION

SECTION 07 92 19 - ACOUSTICAL JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes acoustical joint sealants.

1.2 ACTION SUBMITTALS

- A. Product Data: For each acoustical joint sealant.
- B. Samples: For each kind and color of acoustical joint sealant required.
- C. Acoustical-Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.3 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranties.

1.4 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.
- B. VOC Content of Interior Sealants: Sealants and sealant primers shall comply with the following:
 - 1. Acoustical sealants and sealant primers shall have a VOC content of 250 g/L or less.
- C. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accumetric LLC; BOSS 826 Acoustical Sound Sealant.
 - b. GE Construction Sealants; RCS20 Acoustical.
 - c. Grabber Construction Products; Acoustical Sealant GSC.
 - d. Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - e. Pecora Corporation; AC-20 FTR.
 - f. Serious Energy Inc.; Quiet Seal Pro.
 - g. Tremco, Incorporated; Tremco Acoustical Sealant.
 - h. USG Corporation; SHEETROCK Acoustical Sealant.
 - 2. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
- B. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
- C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
- D. Masking Tape: Non-staining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
- B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF ACOUSTICAL JOINT SEALANTS

- A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
- B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.
- C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

END OF SECTION

SECTION 07 95 00 - EXPANSION CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior expansion control systems.

1.2 ACTION SUBMITTALS

- A. Shop Drawings: For each expansion control system specified. Include plans, elevations, sections, details, splices, blackout requirement, attachments to other work, and line diagrams and a tabular schedule of expansion control systems.
- B. Samples: For each exposed expansion control system and for each color and texture specified.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. General: Provide expansion control systems of design, basic profile, materials, and operation indicated. Provide units with capability to accommodate variations in adjacent surfaces.
1. Furnish units in longest practicable lengths to minimize field splicing. Install with hairline mitered corners where expansion control systems change direction or abut other materials.
 2. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion control systems.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Where indicated, provide expansion control systems with fire barriers identical to those of systems tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.
1. Hose Stream Test: Wall-to-wall and wall-to-ceiling systems shall be subjected to hose stream testing.

- B. Seismic Performance: Expansion control systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 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. Component Importance Factor is 1.5.

2.3 INTERIOR EXPANSION CONTROL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Architectural Art Mfg., Inc.; Division of Pittcon Industries.
 - 2. Construction Specialties, Inc.
 - 3. InPro Corporation (IPC).
 - 4. MM Systems Corporation.
 - 5. Nystrom, Inc.
- B. Source Limitations: Obtain expansion control systems from single source from single manufacturer.
- C. EJ-1 , Wall-to-Wall:
 - 1. Design Criteria:
 - a. Nominal Joint Width: .25".
 - b. Minimum Joint Width: .125".
 - c. Maximum Joint Width: .3125".
 - d. Movement Capability: -25 percent/+ 75 percent.
 - e. Type of Movement: Seismic.
 - 2. Type: Glide plate.
 - a. Metal: Aluminum.
 - 1) Finish: Manufacturer's standard.

2.4 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard moisture barrier consisting of a continuous, waterproof membrane within joint and attached to substrate on sides of joint below the primary cover. Equip moisture barrier with drain tubes and seals to direct collected moisture to exterior-wall expansion control system.

2.5 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 - B. Elastomeric Seals: ASTM E 1783; preformed elastomeric membranes or extrusions to be installed in metal frames.
 - C. Compression Seals: ASTM E 1612; preformed elastomeric extrusions having an internal baffle system and designed to function under compression.
 - D. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.
 - E. Fire Barriers: Any material or material combination to meet performance criteria for required fire-resistance rating.
 - F. Moisture Barrier: Flexible elastomeric material.
 - G. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M.
 - H. Accessories: Manufacturer's standard anchors, clips, fasteners, and other accessories as indicated or required for complete installations.
- 2.6 ALUMINUM FINISHES
- A. Mill finish.
 - B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare substrates according to expansion control system manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion control systems.
- C. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion control systems and materials unless more stringent requirements are indicated.

- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion control systems.
 - 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper expansion control system installation and performance.
 - 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - 4. Repair or grout blockout as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 5. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - 1. Provide in continuous lengths for straight sections.
 - 2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Foam Seals: Install with adhesive recommended by manufacturer.
- E. Terminate exposed ends of expansion control systems with field- or factory-fabricated termination devices.
- F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion control system materials and associated work so complete assemblies comply with assembly performance requirements.
 - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

3.3 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION

SECTION 08 12 13 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes hollow-metal frames.
- B. Related Requirements:
 - 1. Section 08 14 16 "Flush Wood Doors" for wood doors installed in hollow-metal frames.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include elevations, frame profiles, metal thicknesses, preparations for hardware, and other details.
- C. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amweld International, LLC.
 - 2. Ceco Door Products; an Assa Abloy Group company.
 - 3. Commercial Door & Hardware Inc.
 - 4. Concept Frames, Inc.
 - 5. Curries Company; an Assa Abloy Group company.
 - 6. Door Components, Inc.

7. Fleming-Baron Door Products.
8. Gensteel Doors Inc.
9. Greensteel Industries, Ltd.
10. HMF Express.
11. Hollow Metal Inc.
12. Hollow Metal Xpress.
13. J/R Metal Frames Manufacturing, Inc.
14. Karpen Steel Custom Doors & Frames.
15. L.I.F. Industries, Inc.
16. LaForce, Inc.
17. MPI Group, LLC (The).
18. National Custom Hollow Metal.
19. North American Door Corp.
20. Philipp Manufacturing Co (The).
21. Pioneer Industries, Inc.
22. Premier Products, Inc.
23. Republic Doors and Frames.
24. Steelcraft; an Ingersoll-Rand company.
25. Steward Steel; Door Division.

2.2 INTERIOR FRAMES

- A. Heavy-Duty Frames: SDI A250.8, Level 2. At locations indicated in the Door and Frame Schedule.

1. Physical Performance: Level B according to SDI A250.4.
2. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
3. Construction: Slip-on drywall.
4. Exposed Finish: Factory.

2.3 FRAME ANCHORS

- A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

- B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch, and as follows:

2.4 MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- C. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B.
- D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- E. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- F. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- G. Power-Actuated Fasteners in Concrete: From corrosion-resistant materials.
- H. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- I. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing).
- J. Glazing: Comply with requirements in Section 08 80 00 "Glazing."
- K. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.
 - 4. Jamb Anchors: Provide number and spacing of anchors as follows:

- a. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c.
 - b. Compression Type: Not less than two anchors in each frame.
 - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches from top and bottom of frame. Space anchors not more than 26 inches o.c.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
 1. Reinforce frames to receive non-templated, mortised, and surface-mounted hardware.
 2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: SDI A250.10.

2.7 ACCESSORIES

- A. Grout Guards: Formed from same material as frames, not less than 0.016 inch thick.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hollow-Metal Frames: Install hollow-metal frames for doors , and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. At fire-rated openings, install frames according to NFPA 80.
 - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - c. Install frames with removable stops located on secure side of opening.
 - d. Install door silencers in frames before grouting.

- e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
- a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
- 4.
5. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
6. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

SECTION 08 12 16 - ALUMINUM FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior aluminum frames for doors installed in gypsum board partitions.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For aluminum frames:
 - 1. Include elevations, sections, and installation details for each wall-opening condition.
- C. Samples: For each exposed product and for each color and texture specified.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Frameworks Manufacturing.
 - 2. Interior Components Inc.
 - 3. Modulex, Inc; Division of Pacific National Group.
 - 4. RACO Interior Products, Inc.
 - 5. Versatrac.
 - 6. Western Integrated Materials, Inc.
 - 7. Wilson Partitions.
- B. Source Limitations: Obtain aluminum frames from single source from single manufacturer.

2.2 COMPONENTS

- A. Recycled Content of Aluminum Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

- B. Aluminum Framing: ASTM B 221, with alloy and temper required to suit structural and finish requirements, and not less than 0.062 inch thick.
- C. Door Frames: Extruded aluminum, reinforced for hinges, strikes, and closers.
- D. Door Tracks: Extruded aluminum where exposed, sized to enclose sliding-door hardware, and in finish matching frame and trim finish.
- E. Trim: Extruded aluminum, not less than 0.062 inch thick; removable, snap-in casing trim and door stops, without exposed fasteners.
 - 1. Trim Style: Flat.
- F. Frame and Trim Finish: Clear-anodized aluminum.

2.3 ACCESSORIES

- A. Fasteners: Aluminum, nonmagnetic, stainless-steel or other noncorrosive metal fasteners compatible with frames, stops, panels, reinforcement plates, hardware, anchors, and other items being fastened.
- B. Door Silencers: Manufacturer's standard continuous mohair, wool pile, or vinyl seals in gray color.
- C. Glazing Gaskets: Manufacturer's standard extruded or molded rubber or plastic, to accommodate glazing thickness indicated; in gray.
- D. Glass: As specified in Section 08 80 00 "Glazing."
- E. Door Hardware: As specified in Section 08 71 00 "Door Hardware."

2.4 FABRICATION

- A. Provide concealed corner reinforcements and alignment clips for accurately fitted hairline joints at butted and mitered connections.
- B. Factory prepare aluminum frames to receive templated mortised hardware; include cutouts, reinforcements, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Section 08 71 00 "Door Hardware."
 - 1. Locate hardware cutouts and reinforcements as required by fire-rated label for assembly.
- C. Fabricate frames for glazing with removable stops to allow glazing replacement without dismantling frame.
 - 1. Locate removable stops on the inside of spaces accessed by keyed doors.
- D. Fabricate components to allow secure installation without exposed fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install aluminum frames plumb, rigid, properly aligned, and securely fastened in place; according to manufacturer's written instructions.
- B. Install frame components in the longest possible lengths with no piece less than 96 inches or shorter shall be one piece.
- C. Glass: Install glass according to Section 08 80 00 "Glazing" and aluminum-frame manufacturer's written instructions.
- D. Doors: Install doors aligned with frames and fitted with required hardware.
- E. Door Hardware: Install according to Section 08 71 00 "Door Hardware" aluminum-frame manufacturer's written instructions.

3.2 ADJUSTING

- A. Clean exposed frame surfaces promptly after installation, using cleaning methods recommended in writing by frame manufacturer and according to AAMA 609 and 610.
- B. Touch Up: Repair marred frame surfaces to blend inconspicuously with adjacent unrepaired surface as viewed by Architect. Remove and replace frames with damaged finish that cannot be satisfactorily repaired.

END OF SECTION

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with hardboard or MDF faces.
2. Shop priming flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of door.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Algoma Hardwoods, Inc.
 2. Chappell Door Co.
 3. Eggers Industries.
 4. Graham Wood Doors; an Assa Abloy Group company.
 5. Marshfield Door Systems, Inc.
 6. Mohawk Doors; a Masonite company.
 7. Oshkosh Door Company.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. Regional Materials: Flush wood doors 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. Regional Materials: Flush wood doors shall be manufactured within 500 miles of Project site.
- D. Certified Wood: Flush wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- E. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- F. 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."
- G. WDMA I.S.1-A Performance Grade:
1. Heavy Duty unless otherwise indicated.
- H. Structural-Composite-Lumber-Core Doors:
1. Structural Composite Lumber: WDMA I.S.10.

- a. Screw Withdrawal, Face: 700 lbf.

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:

- 1. Grade: Premium.
- 2. Faces: Hardboard or MDF.
- 3. Core: Either glued wood stave or structural composite lumber.
- 4. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

- 1. Comply with NFPA 80 requirements for fire-rated doors.

B. Factory machine doors for hardware that is not surface applied.

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

- 1. Light Openings: Trim openings with moldings of material and profile indicated.
- 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."
- 3. Louvers: Factory install louvers in prepared openings.

2.5 SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in [Section 09 91 23 "Interior Painting."

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

- 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Use only paints and coatings that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - 1. Install fire-rated doors according to NFPA 80.
 - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.

END OF SECTION

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each type of access door and frame and for each finish specified.
- C. Product Schedule: For access doors and frames use scheduled designations.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

- A. Flush Access Doors with Concealed Flanges:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Babcock-Davis.
 - b. Cendrex Inc.
 - c. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
 - d. Jensen Industries; Div. of Broan-Nutone, LLC.
 - e. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
 - f. Larsen's Manufacturing Company.
 - g. Maxam Metal Products Limited.
 - h. MIFAB, Inc.
 - i. Milcor Inc.
 - j. Nystrom, Inc.
 - 2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
 - 3. Locations: Wall and ceiling.
 - 4. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed.
 - 5. Frame Material: Same material and thickness as door.
 - 6. Latch and Lock: Cam latch, hex-head wrench operated.

2.2 MATERIALS

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

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

2.3 FABRICATION

- A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- C. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 - 2. Keys: Furnish two keys per lock and key all locks alike.
 - 3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 08 71 00 "Door Hardware."

2.4 FINISHES

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

PART 3 - EXECUTION

3.1 INSTALLATION

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

END OF SECTION

SECTION 08 41 26 - ALL-GLASS ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

Section Includes:

1. Interior swinging all-glass entrance doors.
2. All-glass sidelights.
3. Interior all-glass storefronts.

1.2 PREINSTALLATION MEETINGS

Pre-installation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

Product Data: For each type of product.

Shop Drawings: For all-glass entrances and storefronts.

1. Include plans, elevations, and sections.
2. Include details of fittings and glazing, including isometric drawings of rail fittings.
3. Door hardware locations, mounting heights, and installation requirements.

Samples: For each type of exposed finish indicated.

Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

1.4 INFORMATIONAL SUBMITTALS

Product test reports.

Sample warranties.

1.5 CLOSEOUT SUBMITTALS

Maintenance data.

1.6 QUALITY ASSURANCE

Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

1.7 WARRANTY

Special Warranty: Manufacturer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

- a. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

Structural Loads:

1. Deflection Limits: Deflection normal to glazing plane is limited to 1/175 of clear span or 3/4 inch, whichever is smaller.

2.2 MANUFACTURERS

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

1. Avanti Systems, Inc.
2. Blumcraft of Pittsburgh; C.R. Laurence Co, Inc.
3. Doralco Architectural Metals.
4. Oldcastle Building Envelope.
5. Virginia Glass Products Corporation.

2.3 METAL COMPONENTS

Fitting Configuration:

1. Manual-Swinging, All-Glass Entrance Doors Sidelights: Continuous rail fitting at top and bottom.
2. All-Glass Storefronts: Recessed glazing channel at top and continuous rail fitting at bottom.

Rail Fittings:

3. Material: Stainless-steel-clad aluminum.
4. Height:
 - a. Top Rail: 4 inches.
 - b. Bottom Rail: 4 inches.
5. Profile: Square.
6. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.

Accessory Fittings: Match rail-fitting metal and finish for the following:

7. Overhead doorstop.
8. Center-housing lock.

Anchors and Fastenings: Concealed.

Weather Stripping: Pile type; replaceable without removing all-glass entrance doors from pivots.

Materials:

9. Stainless-Steel Cladding: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.

2.4 GLASS

Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.

1. Class 1: Clear monolithic.
 - a. Thickness: 1/2 inch minimum.
 - b. Locations: As indicated.
2. Exposed Edges: Machine ground and flat polished.
3. Butt Edges: Flat ground.
4. Corner Edges: Lap-joint corners with exposed edges polished.

2.5 ENTRANCE DOOR HARDWARE

General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of rail fittings.

Concealed Overhead Closers and Top Pivots: Center hung; BHMA A156.4, Grade 1; including cases, bottom arms, top walking beam pivots, plates, and accessories required for complete installation.

1. Swing: Single acting.
 - a. Positive Dead Stop: Coordinated with hold-open angle if any, or at angle selected.
2. Hold Open: Selective.
3. Opening-Force Requirements:
 - a. Accessible Interior Doors: Not more than 5 lbf to fully open door.

Push-Pull Set: As indicated.

Single-Door and Active-Leaf Locksets: Center-housing deadbolt with pulls unless magnetic release hardware is specified.

4. Deadbolt operated by key outside and thumb turn inside.

Cylinders: Six-pin cylinder, BHMA A156.5, Grade 1.

2.6 FABRICATION

Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.

1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.

Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 INSTALLATION

Install all-glass systems and associated components according to manufacturer's written instructions.

Set units level, plumb, and true to line, with uniform joints.

Maintain uniform clearances between adjacent components.

Lubricate hardware and other moving parts according to manufacturer's written instructions.

Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

Install butt-joint sealants according to manufacturer's instructions and as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.

END OF SECTION

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

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

B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.

1. Pivots and lock cylinders to be installed under other Sections.
2. Permanent lock cores to be installed by Owner.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Details of electrified door hardware.

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

D. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:
 - 1) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.

- 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 MAINTENANCE MATERIAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
 1. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC).
- C. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- D. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- E. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- F. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1 for door hardware on doors in an accessible route.
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding Doors: 5 lbf applied parallel to door at latch.

- c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
- 3. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.
- G. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- B. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Three years from date of Substantial Completion, unless otherwise indicated.
 - a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.
 - b. Exit Devices: Two years from date of Substantial Completion.
 - c. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" Article to comply with requirements in this Section.
 - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 - 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.
2. References to BHMA Designations: Provide products complying with these designations and requirements for description, quality, and function.

2.2 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. IVES Hardware; an Ingersoll-Rand company.
 - c. Lawrence Hardware Inc.
 - d. McKinney Products Company; an ASSA ABLOY Group company.
 - e. PBB, Inc.

2.3 CENTER-HUNG AND OFFSET PIVOTS

- A. Center-Hung and Offset Pivots: BHMA A156.4.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - b. IVES Hardware; an Ingersoll-Rand company.
 - c. Rixson Specialty Door Controls; an ASSA ABLOY Group company.

2.4 MECHANICAL LOCKS AND LATCHES

- A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
 1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
 2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
 3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
 4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- B. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - b. Corbin Russwin Architectural Hardware; n ASSA ABLOY Group Company.
 - c. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
 - d. PDO Manufacturing.
 - e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - f. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - g. Yale Security Inc.; an ASSA ABLOY Group company.
- C. Mortise Locks: BHMA A156.13; Operational Grade 1; stamped steel case with steel or brass parts; Series 1000.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - c. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - d. Marks USA.
 - e. PDO Manufacturing.
 - f. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - g. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - h. Yale Security Inc.; an ASSA ABLOY Group company.

2.5 AUXILIARY LOCKS

- A. Narrow Stile Auxiliary Locks: BHMA A156.5; Grade [1] [2]; with strike that suits frame.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.

2.6 ELECTROMAGNETIC LOCKS

- A. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Door Controls International, Inc.
 - b. Dortronics Systems, Inc.
 - c. DynaLock Corp.
 - d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.
 - f. Security Door Controls.
- B. Delayed-Egress Electromagnetic Locks: BHMA A156.24, electrically powered, with electromagnet attached to frame and armature plate attached to door; depressing

push bar for more than 3 seconds initiates irreversible alarm and 15-second delay for egress. When integrated with fire alarm, fire alarm voids 15-second delay.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Door Controls International, Inc.
 - b. Doorguard Systems, Inc.
 - c. DynaLock Corp.
 - d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.

2.7 ELECTROMECHANICAL LOCKS

- A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; mortise latchbolt; with strike that suits frame.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - b. DynaLock Corp.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - e. Security Door Controls.
 - f. Yale Security Inc.; an ASSA ABLOY Group company.

2.8 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - c. Door Controls International, Inc.
 - d. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - e. Dor-O-Matic; an Ingersoll-Rand company.
 - f. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc.
 - g. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - h. Von Duprin; an Ingersoll-Rand company.
 - i. Yale Security Inc.; an ASSA ABLOY Group company.

2.9 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Same manufacturer as for locking devices.
- B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
- C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.10 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 1. No Master Key System: Only change keys operate cylinder.
 2. Master Key System: Change keys and a master key operate cylinders.
 3. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 4. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
 5. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - b. Re-key Owner's existing master key system into new keying system.
 6. Keyed Alike: Key all cylinders to same change key.
- B. Keys: Nickel silver.
 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE."
 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.
 - d. Great-Grand Master Keys: Five.

2.11 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. HPC, Inc.

- b. Lund Equipment Co., Inc.
- c. MMF Industries.

- 2. Multiple-Drawer Cabinet: Cabinet with drawers equipped with key-holding panels and key envelope storage, and progressive-type ball-bearing suspension slides. Include single cylinder lock to lock all drawers.
- 3. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
- 4. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.

2.12 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Burns Manufacturing Incorporated.
 - b. Forms + Surfaces.
 - c. Hager Companies.
 - d. Hiawatha, Inc.
 - e. IVES Hardware; an Ingersoll-Rand company.
 - f. Rockwood Manufacturing Company.

2.13 PULLS

- A. Ladder pulls to be stainless steel. All pulls to be non-locking unless noted otherwise in drawings.
 - 1. Basis-of-Design Product: Provide Rockwood Manufacturing Company; MegaTek Straight pulls with Square Ends, 1 1/4" minimum diameter.

2.14 FLOOR STOPS

- A. Floor stops to be stainless steel.
 - 1. Basis-of-Design Product: Provide Rockwood Manufacturing Company; RM850 Door Stop.

2.15 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - b. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - c. LCN Closers; an Ingersoll-Rand company.
 - d. Norton Door Controls; an ASSA ABLOY Group company.
 - e. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - f. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - g. Yale Security Inc.; an ASSA ABLOY Group company.

2.16 OVERHEAD STOPS AND HOLDERS

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

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Architectural Builders Hardware Mfg., Inc.
 - b. Rockwood Manufacturing Company.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.17 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Hager Companies.
 - b. National Guard Products.
 - c. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - d. Reese Enterprises, Inc.
 - e. Zero International.

2.18 SLIDING DOOR HARDWARE

A. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated. Basis-of-Design Product: Subject to compliance with requirements, provide Hafele - Flatec with solid stainless steel track.

2.19 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Hager Companies.
 - c. Rockwood Manufacturing Company.
 - d. Trimco.

2.20 AUXILIARY ELECTRIFIED DOOR HARDWARE

A. Auxiliary Electrified Door Hardware:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DynaLock Corp.
 - b. GE Security, Inc.
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - d. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - e. Securitron Magnalock Corporation; an ASSA ABLOY Group company.
 - f. Security Door Controls.

2.21 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.

- b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Closers to doors and frames.
- 3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.22 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- D. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- E. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than

one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.

- F. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - 1. Replace construction cores with permanent cores as indicated in keying schedule.
 - 2. Furnish permanent cores to Owner for installation.
- G. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- H. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
 - 1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
- I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- L. 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.

3.2 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

END OF SECTION

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Glass for doors and interior borrowed lites.
2. Glazing sealants and accessories.

1.2 COORDINATION

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE

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

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.

1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.7 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Glass Product: Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:
 1. AGC Glass Company North America, Inc.
 2. Berkowitz, JE, LP.
 3. Cardinal Glass Industries.
 4. Guardian Industries Corp.
 5. Oldcastle BuildingEnvelope.
 6. Pilkington North America Inc.
 7. PPG Industries, Inc.
 8. Saint-Gobain Corporation.
 9. Viracon, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.
- B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 - B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
 - C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
 - D. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass. Where fully tempered float glass is indicated, provide fully tempered float glass.
- 2.4 GLASS PRODUCTS
- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
 - B. Ultraclear Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. AGC Glass Company North America, Inc.; Krystal Klear.
 - b. Bendheim, LTD.; Clear Crystal.
 - c. Guardian Industries Corp.; UltraWhite.
 - d. Pilkington North America; Optiwhite.
 - e. PPG Industries, Inc.; Starphire.
 - f. Vetrotech Saint-Gobain; Diamant.
 - C. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) as indicated, Quality-Q3.
- 2.5 LAMINATED GLASS
- A. Laminated Glass: ASTM C 1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 1. Construction: Laminate glass with ionomeric polymer interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written instructions.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Color: Clear unless otherwise indicated.

2.6 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - 1. AAMA 804.3 tape, where indicated.
 - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.7 MISCELLANEOUS GLAZING MATERIALS

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

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged

glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

3.2 TAPE GLAZING

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

3.3 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.4 GLASS SCHEDULE

1. See sheet A00-70 for glazing schedule.

END OF SECTION

SECTION 08 83 00 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes the following types of silvered flat glass mirrors:

1. Annealed monolithic glass mirrors.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
- C. Samples: For each type of the following:
1. Mirrors: 12 inches square, including edge treatment on two adjoining edges.
 2. Mirror Clips: Full size.
 3. Mirror Trim: 12 inches long.

1.3 INFORMATIONAL SUBMITTALS

- A. Preconstruction test report.
- B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS

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

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing.

1.6 WARRANTY

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

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Binswanger Glass.
 2. D & W Incorporated.
 3. Gardner Glass Products, Inc.
 4. Guardian Industries Corp.
 5. Independent Mirror Industries, Inc.
 6. Lenoir Mirror Company.
 7. National Glass Industries.
 8. Virginia Mirror Company, Inc.

2.2 SILVERED FLAT GLASS MIRRORS

- A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
- B. Annealed Monolithic Glass Mirrors: Mirror Select Quality, clear.
1. Nominal Thickness: 6.0 mm.

2.3 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating approved by mirror manufacturer.
- C. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Franklin International.
 - b. Laurence, C. R. Co., Inc.
 - c. Liquid Nails Adhesive.
 - d. Pecora Corporation.
 - e. Royal Adhesives & Sealants, LLC.
 2. Adhesive shall have a VOC content of 70 g/L or less.
 3. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 FABRICATION

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

3.2 PREPARATION

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

3.3 INSTALLATION

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

END OF SECTION

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS

A. Evaluation reports for firestop tracks.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
 2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

- C. Studs and Runners: ASTM C 645.
1. Steel Studs and Runners:
 - a. Minimum Base-Metal Thickness: As required by performance requirements for horizontal deflection.
 - b. Depth: As indicated on Drawings.
- D. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Clip System: Clips designed for use in head-of-wall deflection conditions that provide a positive attachment of studs to runners while allowing 1-1/2-inch minimum vertical movement.
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CEMCO; California Expanded Metal Products Co.
 - b. ClarkDietrich Building Systems.
 - c. Fire Trak Corp.
 - d. Steel Network, Inc. (The).
 3. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 4. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 5. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 - a. Products: Subject to compliance with requirements, provide[one of] the following:
 - 1) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.
 - 2) MBA Building Supplies; Slotted Deflecto Track.
 - 3) Steel Network Inc. (The); VertiTrack VTD Series.
- E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.0598 inch.
- F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.
1. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: 0.0179 inch.

2. Depth: As indicated on Drawings.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 3/4 inch.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. MRI Steel Framing, LLC.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Hanger Attachments to Concrete:
1. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488/E 488M conducted by a qualified testing agency.
 2. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
1. Depth: 1-1/2 inches.
- F. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.

2. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
 - b. Depth: As indicated on Drawings.
3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
 - a. Minimum Base-Metal Thickness: 0.0179 inch.
4. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
 1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754.
 1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.2 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - 6. Curved Partitions:
 - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.

- b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, counter-splaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

- a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
- 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
- 5. Do not attach hangers to steel roof deck.
- 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
- 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
- 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.

1.2 ACTION SUBMITTALS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. 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 50 percent.
- B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles of Project site.
- C. 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.
- D. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered.
- B. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
 - 1. Thickness: 1/2 inch.

2. Long Edges: Tapered.

- C. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: As Indicated.
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, rolled zinc, plastic, or paper-faced galvanized-steel sheet.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. 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.

- 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 drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - 1. Laminating adhesive shall have a VOC content of 50 g/L or less).
 - 2. Laminating adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- 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 25 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 products by one of the following:
 - a. Accumetric LLC.
 - b. Pecora Corporation.
 - c. Specified Technologies, Inc.
 - d. USG Corporation.
 - 2. Acoustical joint sealant shall have a VOC content of 250 g/L or less.
 - 3. Acoustical joint sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

- A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- B. Comply with ASTM C 840.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. 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.
- E. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for acoustical tile.
 - 3. Level 3: Not applicable.
 - 4. 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 09 91 23 "Interior Painting."
 - 5. Level 5: Conference Rooms 206, 207, & 208 where surface is exposed and gypsum board ceilings.
 - a. Primer and its application to surfaces are specified in Section 09 91 23 "Interior Painting."

3.2 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION

SECTION 09 30 13 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Porcelain tile.
 - 2. Tile backing panels.
 - 3. Crack isolation membrane.
 - 4. Metal edge strips.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples:
 - 1. Each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required.
 - 3. Stone thresholds.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

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

1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
 - 2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

3. Installer employs Ceramic Tile Education Foundation Certified Installers.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Build mockup of each type of floor tile installation.
 2. Build mockup of each type of wall tile installation.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

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

2.2 TILE PRODUCTS

- A. Ceramic Tile Type: See sheet A00-70 for scheduled products.

2.3 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. C-Cure; C-Cure Board 990.
 - b. Custom Building Products; Wonderboard.
 - c. FinPan, Inc.; ProTEC Concrete Backer Board.
 - d. USG Corporation; DUROCK Cement Board.
 2. Thickness: 5/8 inch.

2.4 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following; that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

- B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bonsal American, an Oldcastle company; B 6000 Waterproof-Crack Isolation Membrane with B 6000 Mesh.
 - b. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane.
 - c. MAPEI Corporation; Mapelastic HPG with MAPEI Fiberglass Mesh.

2.5 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ardex Americas.
 - b. Bonsal American; an Oldcastle company.
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation.
 - e. TEC; H. B. Fuller Construction Products Inc.
2. Provide prepackaged, dry-mortar mix to which only water must be added at Project site.
3. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
4. For wall applications, provide nonsagging mortar.

2.6 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide MAPEI Corporation.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; exposed-edge material.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

- a. Tile floors in wet areas.
 - B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
 - C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
 - D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
 - E. Where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.
 - F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Porcelain Tile: 1/8 inch.
 - H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
 - I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
 - J. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
 - K. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- 3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE
- A. Interior Floor Installations, Concrete Subfloor:
 - 1. Ceramic Tile Installation: TCNA F113; thinset mortar.
 - a. Ceramic Tile Type: T-1.
 - b. Thinset Mortar: Latex- portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
 - B. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
 - a. Ceramic Tile Type: T-2.
 - b. Thinset Mortar: Latex- portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.

END OF SECTION

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Evaluation reports.
- C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
 - 2. Smoke-Developed Index: 450 or less.

2.2 ACOUSTICAL PANEL CEILINGS, GENERAL

- A. Low-Emitting Materials: Acoustical panel ceilings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- C. Glass-Fiber-Based Panels: Made with binder containing no urea formaldehyde.
- D. Acoustical Panel Standard: Comply with ASTM E 1264.
- E. Metal Suspension System Standard: Comply with ASTM C 635.
- F. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACS, ACOUSTICAL PANELS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Armstrong World Industries, Inc.
- B. Classification: As scheduled.
- C. Color: As indicated on Drawings.
- D. Edge/Joint Detail: Square Tegral.
- E. Thickness: As indicated on Drawings.
- F. Modular Size: As indicated on Drawings.

2.4 METAL SUSPENSION SYSTEM

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

PART 3 - EXECUTION

3.1 INSTALLATION

- A. 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. 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.
 - 1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans.

END OF SECTION

SECTION 09 64 00 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Factory-finished wood flooring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Certification: Wood floors shall be certified under the RFCI FloorScore program.
1. Floor finishes shall comply with requirements of SCAQMD Rule 1113, "Architectural Coatings."
- B. Low-Emitting Materials: Wood flooring system elements shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Composite Wood and Wood-Fiber Products: Shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- D. Hardwood Flooring: Comply with NWFA A500 for species, grade, and cut.

1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.
- E. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
 1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.
- F. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.
- G. Engineered-Wood Flooring: HPVA EF, except bonding agent contains no urea formaldehyde.
 1. Species: Walnut.
 2. Thickness: 9/16".
 3. Face Width: 5 inches.
 4. Length: Manufacturer's standard.
 5. Finish: UV urethane.

2.2 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6.0 milsthick.
- B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
 1. VOC Content: Not more than 100 g/L.
- C. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- D. Reducer Strips: To match wood flooring. 2 inches wide, tapered, and in thickness required to match height of flooring.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.

- b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- c. Perform additional moisture tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

A. Concrete Slabs:

- 1. Grind high spots and fill low spots to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
- 2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
- 3. 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."
- B. Provide expansion space at walls and other obstructions and terminations of flooring as recommended by the manufacturer.
- C. Vapor Retarder: Comply with the following for vapor retarder installation:
 - 1. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- D. Engineered-Wood Flooring: Install floating floor.

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

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Resilient base.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.
- B. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 RB, THERMOSET-RUBBER BASE

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 1. Roppe Corporation, USA.
- B. Product Standard: ASTM F 1861, Type TS (rubber, vulcanized thermoset), Group I (solid, homogeneous).
 1. Style and Location:
 - a. Style A, Straight: Provide in areas with carpet.
 - b. Style B, Cove: Provide in areas with resilient flooring.
- C. Thickness: 0.125 inch.
- D. Height: As indicated on Drawings.

- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed or preformed.
- G. Inside Corners: Job formed.
- H. Colors: Match Architect's sample.

2.3 RMA, RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - 1. Roppe Corporation, USA.
- B. Description: Rubber nosing for carpet, [nosing for resilient flooring.
- C. Profile and Dimensions: As indicated.
- D. Locations: Provide rubber molding accessories in areas indicated.
- E. Colors and Patterns: Match Architect's sample.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
 - 1. Adhesives shall have a VOC content of 50 g/L or less.
 - 2. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by resilient stair-tread manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

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

- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F 710.
1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing: Proceed with installation only after substrates pass testing according to manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are the same temperature as the space where they are to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.2 RESILIENT BASE INSTALLATION

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

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.
 - a. Form without producing discoloration (whitening) at bends.
2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 6 inches in length.
 - a. Miter or cope corners to minimize open joints.

3.3 RESILIENT ACCESSORY INSTALLATION

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

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 1. Apply three coat(s).
- C. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes modular carpet tile.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product test reports.
- B. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

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

1.7 WARRANTY

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

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

PART 2 - PRODUCTS

2.1 CPT, CARPET TILE

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings.
- B. Color: As indicated by manufacturer's designations.
- C. Pattern: Match Architect's samples.
- D. Fiber Content: As scheduled.
- E. Fiber Type: 100% Recycled Content.
- F. Pile Characteristic: As specified.
- G. Yarn Twist: As specified.
- H. Yarn Count: As specified.
- I. Density: As specified.
- J. Pile Thickness: As specified.
- K. Stitches: As specified.
- L. Gage: As specified.
- M. Surface Pile Weight: As specified.
- N. Total Weight: As specified for finished carpet tile.
- O. Primary Backing/Backcoating: GLASBAC Re Tile.
- P. Size: As specified..
- Q. Applied Treatments:
1. Soil-Resistance Treatment: Manufacturer's standard treatment.
2. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet tiles as follows:

- a. 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, and no fungal growth, according to AATCC 174.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
 1. VOC Content: 50 g/L or less.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Concrete Slabs:
 1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

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

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

3.3 INSTALLATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.
- I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- J. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION

SECTION 09 77 13 - STRETCHED-FABRIC WALL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes site-upholstered wall systems.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each stretched-fabric system.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved:
- B. Product certificates.
- C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.7 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace components of stretched-fabric systems that fail in performance, materials, or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Stretched-fabric wall systems shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Fire-Test-Response Characteristics: Stretched-fabric wall systems shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency on systems prepared according to ASTM E 2573. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.2 STRETCHED-FABRIC WALL SYSTEMS

- A. SFW, Stretched-Fabric Wall System: Manufacturer's standard system consisting of facing material stretched tightly over a frame and core material and secured in the frame.
 1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Novawall Systems, Inc.
 2. Core: Glass-fiber board.
 - a. Core-Face Layer: Manufacturer's standard impact-resistant, acoustically transparent, copolymer sheet.
 3. Frame Edge: Square profile.
 - a. Fabric-Insertion Point: [Bottom load] <Insert requirement>.
 - b. Nominal Frame Thickness: Match core thickness.
 4. Reveals between Panels: Flush reveals as indicated on Drawings.
 5. Facing Material: As indicated on Drawings.
 6. Acoustical Performance: Sound absorption according to ASTM C 423 for Type A mounting according to ASTM E 795.

2.3 MATERIALS

- A. Core Materials: [Manufacturer's standard.
 - 1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 - 2. Impact-Resistant, Acoustically Transparent, Copolymer Sheet for Face Layer: 1/16- to 1/8-inch- thick layer of perforated, noncombustible, copolymer sheet laminated to face of core.
- B. Frame Construction: Manufacturer's standard, continuous, extruded plastic frame (track).
- C. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
- D. Lining Material: Fabric [as indicated on Drawings.

2.4 INSTALLATION MATERIALS

- A. Installation Products: Concealed on back of system, recommended by stretched-fabric system manufacturer to support weight of system, fabric tension, and as follows:
 - 1. Adhesives: As recommended by stretched-fabric system manufacturer and with a VOC content of 70 g/L or less.
 - 2. Adhesives: As recommended by stretched-fabric system manufacturer and that comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 3. Fasteners: Manufacturer's standard.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.
- B. Before installation, allow fabric to adjust and become stable in spaces where it will be installed according to stretched-fabric system manufacturer's written instructions. Acclimatize fabric for minimum of 24 hours at ambient temperature and humidity conditions indicated for spaces when occupied for their intended use.

3.2 INSTALLATION

- A. Install stretched-fabric systems according to system manufacturer's written instructions.
 - 1. Provide continuous perimeter frames of each profile indicated, designed to be inconspicuous when covered by fabric facing, with smooth edges, and with surface finish that will not telegraph through fabric facing.
 - 2. Install framing around penetrations.
 - 3. Tightly fit framing to adjacent construction and securely attach to substrate.
 - 4. Install core material with full coverage, flush with face of stretched-fabric system frame.
 - 5. Attach frame and core to substrate with adhesive or fasteners or both to support system and prevent deformation of components.
 - 6. Install stretched-fabric systems level and plumb unless otherwise indicated, true in plane, and with fabric square to the grain.
- B. Fabric Installation: Apply fabric monolithically in continuous run over area, without joints or reveals, except where panel joints or midspan frames are indicated.
 - 1. Fabric Seams: Sewn seams are not permitted.
 - 2. Fabric Seams: Manufacturer's standard sewn seams, straight and parallel; seam dimensions and locations as indicated on Drawings.
 - 3. Stretch and secure fabric to frame edges and so frame and frame attachment method are concealed by fabric unless otherwise indicated.
 - 4. Stretch fabric tightly and square without puckers, ripples, or distortions. Acclimatize and restretch if recommended by stretched-fabric system manufacturer. Repair distortions, wrinkles, and sagging.

3.3 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

SECTION 09 77 23 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped wall panels.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1.
- B. Shop Drawings: For panel assembly and installation.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Panels shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

2.2 FABRIC-WRAPPED WALL PANELS

- A. FWP, Fabric-Wrapped Wall Panel: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
 1. Manufacturers: Subject to compliance with requirements, provide products by Buzzispace
 2. Panel Shape: Flat.
 3. Mounting: Edge mounted with splines secured to substrate.
 4. Mounting: Back mounted with manufacturer's standard [adhesive tape strips, secured to substrate.
 5. Core: Provide wood or plywood nailing strips in core where indicated.
 - a. Core-Face Layer: Manufacturer's standard.
 6. Edge Construction: Manufacturer's standard wood frame, rabbeted, and splined with glued joints and machined corners.
 7. Edge Profile: Square.
 8. Corner Detail in Elevation: Square with continuous edge profile indicated.
 9. Reveals between Panels: Flush reveals as selected by Architect from manufacturer's full range.
 10. Facing Material: indicated on Drawings.
 11. Nominal As indicated on Drawings.

2.3 MATERIALS

1. Wood and Plywood: Manufacturer's standard plywood or clear, vertical grain, straight, kiln-dried hardwood.
 - a. Plywood shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - b. Fire-retardant treated by pressure process with a flame-spread index of 25 or less when tested according to ASTM E 84 or UL 723, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

- 1) Treated material shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity.
 - 2) Kiln-dry material after treatment to 19 percent for lumber and 15 percent or less for plywood.
- B. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
1. Applied Treatments: Stain resistance.
 2. Lining Material: Manufacturer's standard fabric for each use indicated.
- C. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:
1. Adhesives: As recommended by panel manufacturer and with a VOC content of 70 g/L or less.
 2. Adhesives: As recommended by panel manufacturer and that comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- C. Facing Material and Lining Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.
- D. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other

panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.

- B. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.
- C. Align fabric pattern and grain with adjacent panels.

3.2 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

SECTION 09 84 36 - SOUND-ABSORBING CEILING UNITS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes shop-fabricated, sound-absorbing acoustical panel units tested for acoustical performance.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For unit assembly and installation.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale and coordinated with each other, using input from installers of the items involved.
- B. Product certificates.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Units shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as

determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E 84, UL 723, or EN 13501-1; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less. B or A
 - b. Smoke-Developed Index: 450 or less. s1, little or no smoke generation.
2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.2 SOUND-ABSORBING CEILING UNITS

- A. AWP, Sound-Absorbing Ceiling Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - a. Buzzspace as noted on Finish Schedule.
 2. Panel Shape: As indicated on Drawings.
 3. Mounting: Back mounted with manufacturer's standard as indicated on Drawings, secured to substrate.
 4. Core: As noted in drawings.
 5. Edge Profile: Square.
 6. Corner Detail in Elevation: Square with continuous edge profile indicated.
 7. Reveals between Panels: Flush reveals as indicated on Drawings.
 8. Facing Material: As indicated on Drawings.
 9. Acoustical Performance: Sound absorption NRC or SAA of .20 Class E according to ASTM-C324-90a.
 10. Nominal Overall Panel Thickness: As indicated on Drawings.

2.3 MATERIALS

- A. Core Materials: Manufacturer's standard.
 1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer, unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
 2. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 25 and 10, respectively, and with perforated surface.
- B. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
 1. Applied Treatments: Stain resistance.
- C. Mounting Devices: Concealed on back or top edge of unit, recommended by manufacturer to support weight of unit.

2.4 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated, with facing material applied to face, edges, and back border of dimensionally stable core and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Measure each area and establish layout of panels and joints of sizes indicated on Drawings within a given area.
- C. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches adjacent units.
- D. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with edges in alignment with walls and other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain with adjacent units.

3.2 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Steel and iron.
 - 3. Wood.
 - 4. Gypsum board.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of paint system and in each color and gloss of topcoat.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 - 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
- B. Products: Subject to compliance with requirements, provide the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."
- B. Material Compatibility:
 - 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base:
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.

4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Colors: Match Architect's samples] [As indicated in a color schedule.
 1. Ten percent of surface area will be painted with deep tones.

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. Wood: 15 percent.
 3. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."
- B. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System MPI INT 3.1E:

- a. Prime Coat: Primer, alkali resistant, water based, MPI #3.
 - 1) Benjamin Moore.
- b. Prime Coat: Latex, interior, matching topcoat.
- c. Intermediate Coat: Latex, interior, matching topcoat.
- d. Topcoat: Latex, interior, flat (MPI Gloss Level 3).
 - 1) Benjamin Moore

B. Steel Substrates:

1. Latex over Shop-Applied Quick-Drying Shop Primer System MPI INT 5.1X:

- a. Prime Coat: Primer, quick dry, for shop application.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5).
 - 1) Benjamin Moore.

C. Wood Substrates: Wood trim and Doors.

1. Latex over Latex Primer System MPI INT 6.3T:

- a. Prime Coat: Primer, latex, for interior wood.
 - 1) Benjamin Moore.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5).
 - 1) Benjamin Moore.

D. Gypsum Board Substrates:

1. Latex over Latex Sealer System MPI INT 9.2A:
 - a. Prime Coat: Primer sealer, latex, interior.
 - 1) Benjamin Moore
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, flat (MPI Gloss Level 1).
 - 1) Benjamin Moore
 - e. Topcoat: Latex, interior (MPI Gloss Level 3).
 - 1) Benjamin Moore.

END OF SECTION

SECTION 09 93 00 - STAINING AND TRANSPARENT FINISHING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of wood stains and transparent finishes on the following substrates:
 - 1. Interior Substrates:
 - a. Dressed lumber (finish carpentry or woodwork).
 - b. Wood-based panel products.

1.2 DEFINITIONS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
- B. Samples: For each type of finish system and in each color and gloss of finish required.

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each finish system indicated and each color selected to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Architect will select one surface to represent surfaces and conditions for application of each type of finish system and substrate.

- a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
2. Final approval of stain color selections will be based on mockups.
 - a. If preliminary stain color selections are not approved, apply additional mockups of additional stain colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products recommended by the wood manufacturer.
- B. Products: Subject to compliance with requirements, provide one of the products listed in wood finish systems schedules for the product category indicated.

2.2 MATERIALS, GENERAL

- A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products List."
- B. Material Compatibility:
 1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior stains and finishes applied at project site, the following VOC limits, exclusive of colorants added to a tint base.
 1. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 2. Shellacs, Clear: VOC not more than 730 g/L.
 3. Stains: VOC not more than 250 g/L.
 4. Primers, Sealers, and Undercoaters: 200 g/L.
- D. Low-Emitting Materials: Interior stains and finishes shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- E. Stain Colors: Match Architect's samples.

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 Exterior Wood Substrates: 15 percent, when measured with an electronic moisture meter.
- C. Maximum Moisture Content of Interior Wood Substrates: [9percent, when measured with an electronic moisture meter.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with finish application only after unsatisfactory conditions have been corrected.
 - 1. Beginning finish application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - 1. After completing finishing operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each substrate condition and as specified.
 - 1. Remove dust, dirt, oil, and grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - 2. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.

3.3 APPLICATION

- A. Apply finishes according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

- B. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.

3.5 INTERIOR WOOD -FINISH-SYSTEM SCHEDULE

- A. Wood Substrates: Wood trim, architectural woodwork.
 - 1) Manufacturer's recommended finishing system.

END OF SECTION

SECTION 10 22 19 - DEMOUNTABLE PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site-assembled demountable partitions.

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For demountable partitions.
1. Include diagrams for power-, signal-, and control-wiring raceways.
- C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale and coordinated with each other, using input from the installers of the items involved:
- B. Product certificates.
- C. Product test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.6 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. Partition Components: Furnish a quantity of each type of full-size unit with installation tools and materials equal to two percent of the amount installed, but no fewer than one unit.

1.7 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 450 or less.
- B. Acoustical Performance: Where acoustical rating is indicated, provide demountable-partition assembly tested by a qualified testing agency for sound transmission loss performance according to ASTM E 90, calculated according to ASTM E 413, and rated for not less than the STC value indicated.

2.2 SITE-ASSEMBLED DEMOUNTABLE PARTITIONS

- A. General: Site-assembled, progressive, demountable-partition assembly and components that are the standard products of manufacturer.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide dHIVE.
- B. Trim: Continuous, factory-finished, snap-on type; adjustable for variations in floor and ceiling levels.
 1. Exposed-Metal Trim Finish: Clear-anodized aluminum.
- C. Doors: Manufacturer's standard 1-3/4-inch- (45-mm-) thick, frameless glass door construction.
 1. Door Operation: Sliding at office fronts and team rooms, Swinging at conference rooms.
- D. Door Frames: Manufacturer's standard aluminum frames for frameless glass doors.
 1. Frame Finish: Clear-anodized aluminum.
- E. Door Hardware: As selected by Architect from manufacturer's full range.

- F. Glazing Frames: Manufacturer's standard aluminum frames for glazing thickness indicated.

- 1. Frame Finish: Clear-anodized aluminum.

- G. Glazing: Manufacturer's standard fully tempered clear float glass.

- H. Frameless Glazing: Manufacturer's standard fully tempered clear float glass for butt-glazing with top and bottom support.

2.3 OTHER MATERIALS

- A. Recycled Content of Metal Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Adhesives: As recommended by demountable-partition manufacturer and with a VOC content of 70 g/L or less.
- C. Adhesives: As recommended by demountable-partition manufacturer and that comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 FABRICATION

- A. General: Fabricate demountable walls for installation with concealed fastening devices and pressure-fit members that will not damage ceiling or floor coverings. Fabricate systems for installation with continuous seals at floor, ceiling, and other locations where partitions abut fixed construction.
- B. Panels for Site-Assembled Demountable Partitions: Face panels fabricated and finished in modular widths indicated.
- C. Panels for Unitized-Panel Demountable Partitions: Factory-assembled, flush, unitized-panel construction; with faces smooth and free of buckles, oil-canning, and seams; and insulated with solidly packed, inorganic, mineral filler.
 - 1. Factory glaze panels to the greatest extent possible.
- D. Finish Facings: Factory apply finish-facing materials with appropriate backings, using mildew-resistant nonstaining adhesive.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install demountable partitions after other finishing operations have been completed.

1. Install partitions rigid, level, plumb, and aligned. Install seals at connections with floors, ceilings, fixed walls, and abutting surfaces to prevent light and sound transmission.
 2. Except for filler panels scribed to fixed walls or columns, do not modify manufacturer's standard components.
- B. Suspended-Ceiling System: Make alterations to suspended-ceiling system required by partition installation or to gain access to electrical or communication systems without affecting the structural integrity of suspended-ceiling system. Make alterations so they are not noticeable after panel installation.

3.2 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, assemble, disassemble, and maintain demountable partitions.

END OF SECTION

SECTION 10 22 39 – ACOUSTICAL VERTICAL FOLDING PANEL PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Electrically operated, vertically-folding acoustical panel partitions.

1.2 PREINSTALLATION MEETINGS

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

1.3 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM C423 - Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - 2. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
 - 3. ASTM E90 - Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
 - 4. ASTM E413 - Classification for Rating Sound Insulation
 - 5. ASTM E557 - Guide for the Installation of Operable Partitions
- B. National Electrical Manufacturers Association (NEMA):
 - 1. NEMA 1 - Enclosures, General Purpose
- C. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electrical Code
 - 2. NFPA 265 - Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls
 - 3. NFPA 286 - Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
- B. Underwriters Laboratories, Inc. (UL):
 - 1. 1. UL 723 - Test for Surface Burning Characteristics of Building Materials

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For operable panel partitions.
 - 1. Include plans, elevations, sections, details, and attachments to other work.

2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
 3. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Delegated-Design Submittal: For operable panel partitions.
1. Include design calculations for seismic restraints.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinated with each other, using input from installers of the items involved.
1. Floor Tolerances: Coordinate work of cast in place concrete to ensure that floor levelness and flatness tolerances along length of folding panel partitions comply with partition manufacturer's written requirements.
 2. Clear Area Requirements: Coordinate work of facility services installers, including piping, ductwork, and conduit, to ensure clear area at ceiling pockets meets manufacturer's requirements for installation of folding panel partitions.
 3. Support Requirements: Coordinate installation of miscellaneous steel support members required for support of folding panel partitions.
 4. Electrical Wiring Requirements: Coordinate installation of power and control conduit, wiring, and switch control installation requirements specified elsewhere consistent with requirements indicated on approved shop drawings.
 5. Access Requirements: Provide access panels at locations indicated on approved shop drawings for non-accessible ceiling finishes.
- B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
- C. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer.
- D. Product certificates.
- E. Product test reports.
- F. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.
- C. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion or 5,000 cycles, whichever occurs first.
 - 2. Acoustical Performance Warranty Period: Within 10 years or 5,000 cycles, whichever occurs first, from date of Substantial Completion.
 - 3. 3. Extended Components Warranty Period: For materials only, within 10 years from date of Substantial Completion or 5,000 cycles, whichever occurs first.

1.9 MAINTENANCE SERVICE

- A. Maintenance Service: Commencing at Substantial Completion, provide maintenance service for folding panel partitions by manufacturer's authorized service representative during the Warranty Period. Include manufacturer's recommended preventive maintenance, repair or replacement of work or defective components, lubrication, cleaning, and adjusting as required for operation.
- B. Extended Maintenance Service Proposal: Provide proposal to Owner to provide annual extended maintenance service for a period of 5 years commencing at end of Warranty Period. Include manufacturer's recommended preventive maintenance, repair or replacement of minor components, lubrication, cleaning, and adjusting as required for operation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design seismic bracing of tracks to structure above.

- B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the partition panels will remain in place without separation of any parts from the system when subjected to the seismic forces specified."
- C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - 2. Noise-Reduction Requirements: Operable panel 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.
- D. Fire-Test-Response Characteristics: Provide panels with finishes complying with 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: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.
- E. Fire Resistance: Provide fire-rated operable panel partition assemblies complying with NFPA 80, based on testing according to UL 10B for fire-rated door assemblies.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 OPERABLE ACOUSTICAL PANELS

- A. Partition: Partition consists of multiple horizontally-oriented panels arranged in flush vertical planes on each side of a concealed airspace housing pantograph-type folding mechanisms. The partition folds and raises to the top of the opening through the action of an above-ceiling-mounted electric motor acting by concealed cables connected to bottom of partition mounted T-bar. Operating devices and other hardware are fully concealed when partition is deployed and when retracted.
 - 1. Partition Thickness: 11.75 inches.
 - 2. Partition Weight: 7.6 psf.
 - 3. Sound Transmission Class Rating: Partition: 55; Panel 61

2.3 PANELS AND FRAMING

- A. Panel Construction: Galvanized tension-leveled steel face sheets both sides, manufacturer's standard thickness, with 0.75-inch (18-mm) thick honeycomb

paper fill core, and with 1.5-inch (38-mm) thick semi-rigid glass fiber acoustic board backer adhered to the airspace side of panels. Panels are adjoined with 0.5 inch (12 mm) horizontal joints and compressing panel to panel seals.

1. Panel Width: Manufacturer's standard widths.
2. Panels are individually removable and replaceable without affecting operation of partition.

- B. Panel Finish Facings: Provide facings acceptable to partition manufacturer that comply with fire-test-response requirements. Apply facings in factory free of application defects, with invisible seams and with no gaps or overlaps. Secure and conceal raw and selvage edges of facings. See finish schedule for additional information.

- C. Seals: Manufacturer's standard seals identical to seals serving as part of tested assembly meeting performance requirements, designed to minimum sound leakage, fitting tight at contact surfaces and sealing continuously between adjacent panels and between partition and adjacent surfaces when partition is in closed position.

1. Seal at Opening: Provide seal without use of side guides or floor or ceiling tracks.
2. Panel-to-Panel: Continuous 0.5 by 0.25 inch (13 by 6 mm) polyethylene foam panel seals.
3. Bottom Seal: Dual 2 inch (50.8 mm) high PVC bulb seals, continuous contact to flooring, with no fixed bottom track required.
4. Side Seals: 1 inch (25.4 mm) PVC extruded seals, mechanically deployed and retracted, with no fixed wall-mounted guides required.
5. Top Seal: 2 inch (50.8 mm) PVC extruded seals, continuous contact.

2.4 SUSPENSION AND OPERATING MECHANISM

- A. Suspension Components: Steel hangers, welded or bolted to support steel specified elsewhere.
- B. Operating Mechanism: Structural-grade aluminum extrusion pantograph folding assembly with corrosion-resistant fasteners, operated by an overhead electric motor-driven cable system attached to a series of overhead line-shaft-driven cable drums and to a bottom-of-partition T- bar.
1. Wear Components: Provide cable, bushings, spacers, pins, discs, bearings, and sleeves that function quietly and smoothly.

2.5 ELECTRIC OPERATORS AND CONTROLS

- A. General: Factory-assembled electric operating system complying with NFPA 70, of size and capacity recommended and provided by partition manufacturer for specified size, weight, and application; with electric motor and factory-wired controls, line-shaft drive, control station, and accessories required for operation. Include control wiring from control station to motor, and AV/dry contact connector plug for integration with other building systems utilizing maximum 24V controls.

1. Back-up Operating Capacity: Provide motor shaft extension compatible with use of externally-applied drill motor.
- B. Motor Electrical Characteristics: Manufacturer's standard horsepower, 208 VAC, 60 Hz., poly phase.
- C. Control Equipment: NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
- D. Control Stations: One station combination single-key- (position up, down, off) and pushbutton- operated, constant-pressure control station plus one station pushbutton- operated, constant- pressure control station located as indicated on Drawings. Furnish two keys.
- E. Safety Equipment: Equip partition system with limit switches acting to stop partition at its up and down travel limits, and the following:
 1. Electromagnetic Brake: Deployed automatically upon loss of power to system, with minimum retarding torque rating equal to 200 percent of partition motor drive torque.
 2. Emergency Release Mechanism: Manual override and brake release lever enabling manual operation in event of operation failure.
 3. Dynamic Brake: Halting downward motion of partition, or lowering partition at controlled speed not more than 150 percent of normal down speed, in event of failure in the motor drive power train.
 4. Over-Torque Detector: Mechanical sensor attached to motor torque arm acting as an over-travel limit in upward direction in event of primary limit switch failure.
 5. Sensing Edge: Bottom of partition-mounted continuous pressure sensing trip acting to cut power and activate electromagnetic brake in event leading edge of partition comes into contact with an object before partition is in the fully closed position.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine partition opening and structural support to verify compliance with manufacturer's written installation instructions, approved shop drawings, and project documents.
- B. Tolerances: Confirm that folding panel partition opening is constructed within tolerances acceptable to partition manufacturer and meet the following:
 1. Floor:
 - a. Flat within +/- 1/4 inch (6 mm) over length of partition.

- b. Peak to valley undulation of +/- 1/4 inch (6 mm) maximum over not less than 24 inches (610 mm).
 - c. Peak to valley undulation of +/- 1/8 inch (3 mm) maximum over not less than 12 inches (305 mm).
- 2. Support Steel:
 - a. Parallel to center line of partition within 1/8 inch (3 mm) left to right.
 - b. Parallel to floor within 1/2 inch (12.7 mm) over length of partition, including loaded deflection.
- 3. Fixed Walls:
 - a. Vertical within out 1/4 inch (6 mm), in zero.
 - b. Flat within out 1/4 inch (6 mm), in zero.
- C. Examine adjacent partition and sound isolation construction and verify compliance with construction requirements of ASTM E557 and project documents.
- D. Examine condition of panels and seals. Do not install panels or seals with visible damage, including damaged finishes, visible cracks or scratches not readily field-repaired, or deformed seals producing gaps at sealed locations.
- E. Correct out-of-tolerance work and other deficient conditions prior to proceeding with partition installation.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions, ASTM E557, and approved shop drawings.
- B. Install folding panel partitions after adjacent finishing work including painting has been completed.
- C. Attach hangers and operating mechanism using attachments provided by partition manufacturer.
- D. Install panels in proper sequence and orientation.
- E. manufacturer-provided drive motor and mechanism and adjust for quiet, smooth operation of the lifting and lowering mechanism, and full continuous seal at perimeter of partition.
- F. Refer to Division 26 electrical sections for requirements for electrical power and control wiring.

3.3 FIELD QUALITY CONTROL

- A. Light Leakage Test: Illuminate one side of partition installation and observe panel joints and top, side, and bottom seals for voids. Adjust partitions for alignment and full gap-less closure of seals. Provide written report to Architect verifying satisfactory completion of test.

3.4 ADJUSTING AND CLEANING

- A. Adjust and service operating mechanisms. Verify partition operation and safety device operation.
- B. Clean finished surfaces as recommended by partition manufacturer and manufacturer of panel facing materials.
- C. Replace damaged panels and finishes that cannot be repaired to the satisfaction of the Architect.

3.5 DEMONSTRATION

- A. Engage a manufacturer-authorized representative to train Owner's personnel to adjust, operate, and maintain folding panel partitions.

END OF SECTION

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Washroom accessories.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: Full size, for each exposed product and for each finish specified.

1.3 INFORMATIONAL SUBMITTALS

- A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.5 WARRANTY

- A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 WASHROOM ACCESSORIES

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

1. Bobrick Washroom Equipment, Inc.

B. Source Limitations: Obtain public-use washroom accessories from single source from single manufacturer.

C. TPD, Toilet Tissue (Roll) Dispenser:

1. Basis-of-Design Product: B-6997.
2. Description: Double-roll dispenser.
3. Mounting: Recessed.
4. Capacity: Designed for 4-1/2- or 5-inch- diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

D. PTD, Paper Towel (Folded) Dispenser:

1. Basis-of-Design Product: B-318.
2. Mounting: Surface mounted.
3. Minimum Capacity: 600 C-fold or 800 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicator: Pierced slots at sides or front.

E. GB, Grab Bar:

1. Basis-of-Design Product: B-5806.99.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4 finish (satin).
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length: Provide 18 inch vertical, 36" and 42" horizontal bars to comply with ANSI A117.1.

F. MIR, Mirror Unit:

1. Basis-of-Design Product: B-290 2430.
2. Frame: Stainless-steel channel.
 - a. Corners: Welded and ground smooth.

G. RH, Robe Hook:

1. Basis-of-Design Product: B-672.
2. Description: Double-prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 FABRICATION

A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

END OF SECTION

SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher, FEC.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Kidde Residential and Commercial Division.
 - c. Larsens Manufacturing Company.
- B. Cabinet Construction: Nonrated.

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Stainless-steel sheet.
- D. Recessed Cabinet:
1. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
 2. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
- E. Cabinet Trim Material: Stainless-steel sheet.
- F. Door Material: [Stainless-steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear.
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Recessed handle.
- J. Accessories:
1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet glazing.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- K. Materials:
1. Stainless Steel: ASTM A 666, Type 304.
 - a. Finish: No. 4 directional satin finish.
 2. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear.

2.3 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.
- B. Install fire-protection cabinets in locations and at mounting heights acceptable to authorities having jurisdiction.
- C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
- D. Identification: Apply vinyl lettering at locations indicated.
- E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 FE, PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - c. Larsens Manufacturing Company.
 - 2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. FE-1, Multipurpose Dry-Chemical Type in Steel Container: UL-rated A:60-B:C, 10-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 11 31 00 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 PREINSTALLATION MEETINGS

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

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Field quality-control reports.
- C. Sample warranties.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 WARRANTY

- A. Special Warranties: Manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Appliances: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. See Equipment Schedule on A00-90 for product specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

3.2 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - 2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: After installation, start units to confirm proper operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
- B. An appliance will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION

SECTION 12 36 23.13 - PLASTIC-LAMINATE-CLAD COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes plastic-laminate countertops.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products and high-pressure decorative laminate.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples:
 - 1. Plastic laminates, for each color, pattern, and surface finish.

1.3 INFORMATIONAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install countertops until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades indicated for construction, installation, and other requirements.
 - 1. Provide certificates from AWI certification program indicating that countertops, including installation, comply with requirements of grades specified.
- B. Grade: Premium.
- C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in drawings.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. Match Architect's sample.
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material at Sinks: medium-density fiberboard made with exterior glue.
- G. Core Thickness: 3/4 inch.
 - 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- I. Paper Backing: Provide paper backing on underside of countertop substrate.

2.2 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2. Composite Wood and Agrifiber Products: 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."
3. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
4. Softwood Plywood: DOC PS 1.

2.3 ACCESSORIES

- A. Grommets for Cable Passage through Countertops: 2-inch OD, 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.

2.4 MISCELLANEOUS MATERIALS

- A. Adhesives: Do not use adhesives that contain urea formaldehyde.
- B. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
- D. Plastic Seam Filler: Plastic seam and repair filler in color to match plastic laminate.
 1. Product: Seamfil, Kampel Enterprises, Inc.
- E. Colored Caulk: Acrylic latex caulk in color to match plastic laminate.
 1. Product: Colorflex, Kampel Enterprises, Inc.
- F. VOC Limits for Installation Adhesives and Sealants: Use products that 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. Structural Wood Member Adhesive: 140 g/L.
 4. Architectural Sealants: 250 g/L.

2.5 FABRICATION

- A. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets. Ease edges to radius indicated for the following:
 - 1. Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
- B. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Shop cut openings to maximum extent possible to receive appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 - 1. Seal edges of openings in countertops with a coat of varnish.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition countertops to average prevailing humidity conditions in installation areas.

3.2 INSTALLATION

- A. Grade: Install countertops to comply with same grade as item to be installed.
- B. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 - 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
 - 2. Seal edges of cutouts by saturating with varnish.
- C. Field Jointing: Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required.
 - 1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Install countertops level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 - 2. Secure backsplashes to walls with adhesive.
 - 3. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

END OF SECTION

SECTION 12 36 61 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid-surface-material countertops and backsplashes.

1.2 ACTION SUBMITTALS

- A. Product Data: For countertop materials.
- B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
- C. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Configuration: Provide countertops with the following front and backsplash style:
 - 1. Front: Straight, slightly eased at top.
 - 2. Backsplash: Straight, slightly eased at corner.
 - 3. Endsplash: None.
- B. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.
- C. Countertops: 1/4-inch- thick, solid surface material laminated to 3/4-inch- thick particleboard with [wood-trimmed exposed edges] [exposed edges built up with 3/4-inch- thick, solid surface material] [exposed edges faced with 1/4-inch- thick, solid surface material].
- D. Backsplashes: 3/4-inch- thick, solid surface material.

2.2 COUNTERTOP MATERIALS

- A. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- B. Adhesives: 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."

1.

C. Solid Surface Material: Homogeneous solid sheets of filled plastic resin complying with ANSI SS1.

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

a. Caesarstone.

2. Type: Provide Standard Type unless Special Purpose Type is indicated.

3. Colors and Patterns: Match Architect's samples.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION

210500 – COMMON WORK RESULTS FOR FIRE SUPPRESSION:

1.1. General requirements:

A. The "general conditions of the contract for construction," aia document a201, latest edition, and these specifications as applicable are part of this contract.

1. Insurance: in accordance with building requirements and shall include a hold harmless clause for owner and engineer.

B. Codes, permits and inspections:

1. All applicable codes, laws and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor who shall inform the owner, prior to submitting a proposal, of any work or material which violates any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected by the contractor.

2. The contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The contractor shall arrange for inspection and tests of any or all parts of the work if so required by authorities and pay all charges for same. The contractor shall pay all costs for, and furnish to the owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.

C. Site verifications

1. Investigate each space through which equipment must be moved. Where necessary, equipment shall be shipped from manufacturer in sections of size suitable for moving through available restrictive spaces. Ascertain from building owner and tenant at what times of day equipment may be moved through all areas.

2. The contractor shall verify the actual location of existing services and notify the engineer of any issues prior to commencing any work.

3. Submission of a proposal shall be construed as evidence that a careful examination of the portions of the existing building, equipment, etc., which affect this work, and the access to such spaces, has been made and that the contractor is familiar with existing conditions and difficulties that will affect the execution of the work. The contractor is responsible to indicate any discrepancies between the contract drawings and actual field conditions prior to submittal of bid. Submission of a proposal will be construed as evidence that such an examination has been made. Later claims shall not be made for labor, equipment or materials required because of difficulties encountered which could have been foreseen during such an examination. The on-site inspection shall verify existing pipe sizes, clearances, etc. And conditions.

D. Contract documents

1. Prior to submission of the bid, this contractor shall review all drawings of the entire project including general construction, demolition, architectural mechanical, electrical, plumbing and sprinkler and shall include any work required in the bid which is indicated or implied to be performed by this trade in other sections of the work.
2. Any equipment, parts, materials, accessories, or labor that is necessary for proper performance of the mechanical work although not specifically mentioned herein or shown on the drawings, shall be furnished and installed without additional costs.
3. The base building drawings, plans, details, specifications and specification addenda are made part of this contract and shall apply to all work under the contract unless otherwise amended, modified, supplemented or specified herein.

E. Guarantee:

1. The contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year from the date of final certificate for payment and/or from date of actual use of equipment or occupancy of spaces by owner included under the various parts of the work, whichever date is earlier. This work shall be done as directed by the owner. This guarantee shall also provide that where defects occur, the contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the contractor.
2. All material and equipment to be new unless otherwise noted and shall be in accordance with building standards and local building code.
3. Quality and gauge of materials: new, best of their respective kinds, free from defects and listed by underwriters laboratories, inc., or bearing their label. Materials and equipment of similar application shall be of same manufacturer, except as noted.
4. The final acceptance will be made after the contractor has adjusted his equipment, tested the various systems, demonstrated that it fulfills the requirements of the drawings and specifications and has furnished all the required certificates of inspection and approval.

F. Definitions:

1. "provide": to supply, install and connect up complete and ready for safe and regular operation the particular work referred to unless specifically otherwise noted.
2. "install": to erect, mount and connect complete with related accessories.
3. "furnish" or "supply": to purchase, procure, acquire and deliver complete with related accessories.
4. "work": labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.
5. "wiring": raceway, fittings, wire, boxes and related items.

6. "concealed": embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
7. "exposed": not installed underground or "concealed" as defined above.
8. "similar" or "equal": equal in materials, weight, size, design and efficiency of specified product.
9. High-pressure piping system: fire suppression piping system designed to operate at working pressure higher than standard 175 psig.

G. Coordination with building management

1. The work in the building shall be done when and as directed, and in a manner satisfactory to the owner. The work shall be performed so as to cause the least possible inconvenience and disturbance to the present occupants.
2. Connections to existing work: install new work and connect to existing work with minimum interference to existing facilities. Temporary shutdowns of existing services shall be performed at no additional charges, at times not to interfere with normal operation of existing facilities and only with written consent of owner. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.
3. All present material, equipment and construction debris to be removed under this contract shall become the property of the contractor with the exception of specific equipment and apparatus requested by the building representative, architect or as noted to be relocated on the drawings. Removed equipment shall be properly disposed of by this contractor.

H. Shop drawings

1. Prior to the installation of any work and procurement of equipment provide complete set of coordinated shop drawings of all new and existing equipment, indicating capacity dimensions and sequence of operation for written approval by the architect and engineer.
2. Indicate on each shop drawings submitted:
 - A. Project name and location
 - B. Name of architect and engineer
 - C. Item identification
 - D. Approval stamp of prime contractor

3. Submissions:

- A. Submissions 11 in. X 17 in. Or smaller: if the submission is a catalog cut, the contractor shall submit one original and three copies. Otherwise, he shall submit three copies. The architect will forward the original and one copy (two copies when no original is received) to the engineer. All catalog cuts shall be complete.
- B. Submissions larger than 11 in. X 17 in.: submit two prints and one copy in portable document format (pdf) to the architect. The architect will forward one print and the pdf to the engineer.

I. Submit shop drawings for the following:

- 1. Pipe and fittings
- 2. Valves
- 3. Sprinklers
- 4. Piping layouts
- 5. Supports, hangers and guides
- 6. Hydraulic calculations

J. As-built drawings and equipment operational instructions

- 1. Upon completion and acceptance of work, contractor shall furnish written instructions and equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.
- 2. These instructions shall be typed on 8-1/2 in. X 11 in. Paper and bound in three ring binders with clear acetate covers. Contractor shall give three copies of the instructions to the owner and one copy to the engineer.
- 3. The instruction booklet shall bear the name, address and telephone number of the project, architect and engineer.
- 4. Reproducible "as-built" drawings shall be provided indicating the as installed conditions of the work. "as-built" drawings shall be provided to the architect after completion of the installation in autocad r2004 format.

K. Substitutions

- 1. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications. Any changes in layout, electrical characteristics, structural requirements, or design due to the use of a substitution shall be submitted to the engineer as part of this proposal. The contractor takes full responsibility for the substitution and all changes resulting from substitution. All items shall be submitted for review in conjunction with the submittal of the substitution. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substituted item deviates from the specified item, those deviations are to be identified on a line by line basis. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted.

2. All substituted equipment shall conform to space requirements and performance requirements shown on contract documents. Contractor shall replace any equipment that does not meet these requirements at his own expense. Any modifications to associated systems or additional costs attributed to this substitution shall be at this contractor's expense.
 3. Contractor shall submit bid based on specified items and shall supply as an alternate price any substitutions.
- L. Chasing, chopping or core drilling
1. Prior to any chasing, chopping, or core drilling being performed, this contractor shall field investigate existing conditions and coordinate with all appropriate trades and building management to ensure that work will be in harmony with other work and not affect any existing building systems. This work must be approved by building management prior to proceeding.
- M. Demolition, removal and relocation
1. Removal, temporary connections and relocation of certain existing work may be necessary for the installation of the new systems. The contractor shall survey the site and make all necessary changes required based on existing conditions for proper installation of new work.
 2. Disconnect, remove and/or relocate existing material, equipment, and other work as noted or required for proper installation of new system.
 3. Equipment required to be temporarily disconnected and relocated shall be carefully removed, stored, cleaned, reinstalled, reconnected and made operational.
 4. All existing work not indicated for demolition shall be protected from damage. Where existing work to remain is damaged or disturbed, contractor shall repair or replace to owner's and building manager's satisfaction at no cost to the owner or building management.
 5. General contractor to remove all ceiling in areas where new piping is to be installed or existing is altered, as per architect's instructions.
 6. Necessary cutting and patching to accommodate the new work shall be performed by this contractor and coordinated with building management so as to minimize disruption of existing tenants and services. Upon completion of demolition, restore all items to match existing conditions.
 7. All existing material and equipment to be removed under this contract will remain the property of the owner or shall be legally disposed of by this contractor as directed by the architect or owner. Refrigeration contained in existing equipment to be removed shall be reclaimed or legally disposed of in accordance with epa requirements and ashrae.
 8. Provide for legal removal and disposal of all rubbish and debris from the building and site. Coordinate all demolition and removals with building management.

N. Connections to existing work

1. Plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing facilities. All system shutdowns affecting other areas shall be coordinated with building management. Install isolation valves at point of connection to the existing piping. Provide temporary ductwork and piping connections as required to minimize shutdown time.
2. Connect new work to existing work in neat and approved manner. Restore existing work disturbed while installing new work to acceptable condition as determined by architect and building manager.
3. Maintain continuous operation of existing facilities.

O. Access doors in general construction

1. This contractor shall submit to the architect for approval a plan indicating the size (minimum 18"x 18") and location of all access doors required for operation and maintenance of all concealed equipment, devices, valves. Contractor shall arrange for furnishing and installing of all access doors in finished construction and include costs in the bid.

1.2 summary

A. This section includes the following fire suppression systems inside the building

1. Wet-pipe sprinkler systems.

B. Related sections include:

1. Division 16 - electrical

C. Provide all labor, materials, equipment, services and fees necessary for complete and safe installation in conformity with the 2006 international plumbing code and all other applicable industry, national and local codes and authorities having jurisdiction, as indicated on drawings and herein specified.

D. Install work so as to be readily accessible for operation, maintenance and repair.

E. The contractor's proposal for all work shall be predicated on the performance of the work during regular working hours. When so directed, however, the contractor shall install work in overtime and the additional cost to be charged therefore shall be only the "premium" portion of the wages paid.

F. Unless otherwise specifically specified, include all cutting and patching of existing floors, walls, partitions and other materials in the existing building. The contractor shall restore these areas to original condition.

G. Removal and relocation of certain existing work may be necessary for the installation of the new work.

- H. The contractor shall keep all equipment and materials, and all parts of the building, exterior spaces and adjacent streets, sidewalks and pavements, free from material and debris resulting from the execution of this work. Excess materials will not be permitted to accumulate either on the interior or the exterior.
- I. Seal openings through partitions, walls and floors with non-shrinking fire proof caulking or other noncombustible material.
- J. Ordinate all drain downs with building management ten (10) business days in advance. Drain downs to be performed after hours and a full fire watch shall be provided at the tenants cost during all drain downs.

1.3 system descriptions

- A. Combined standpipe and sprinkler system: fire-suppression system with both standpipe and sprinkler systems. Sprinkler system is supplied from standpipe system.

1.4 performance requirements

- A. Standard piping system component working pressure: listed for at least 175 psig.
- B. Fire-suppression sprinkler system design shall be approved by authorities having jurisdiction.
- C. Seismic performance: fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to nfpa 13 and all ibc.

1.5 quality assurance

- A. Installer qualifications: installer's responsibilities include preparing and coordinating shop drawings, fabricating, and installing fire-suppression systems. Base calculations on results of fire-hydrant flow test.
- B. Nfpa standards: fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. International building code
 - 2. Nfpa 13, "installation of sprinkler systems."
 - 3. Va uniform statewide building code
 - 4. International fire code.

1.6 extra materials

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

Part 2 - products

2.1 steel pipe and fittings

- A. Threaded-end, standard-weight schedule 40 steel pipe: astm a 53/a 53m, astm a 135, or astm a 795, hot-dip galvanized where required and with factory- or field-formed threaded ends.
 - 1. Cast-iron threaded flanges: asme b16.1.
 - 2. Malleable-iron threaded fittings: asme b16.3
 - 3. Gray-iron threaded fittings: asme b16.4
 - 4. Steel threaded pipe nipples: astm a 733, made of astm a 53/a 53m or astm a 106, schedule 40, seamless steel pipe hot-dip galvanized where required. Include ends matching joining method.
 - 5. Steel threaded couplings: astm a 865 hot-dip galvanized-steel pipe where required.
- B. Grooved-end, standard-weight schedule 10 or 40 steel pipe as req'd: astm a 53/a 53m, astm a 135, or astm a 795, hot-dip galvanized where indicated and factory, roll-grooved ends.
 - 1. Grooved-joint piping systems:
 - A. Manufacturers:
 - 1) victaulic co. Of america.
 - B. Grooved-end fittings: ul-listed, astm a 536, ductile-iron casting with od matching steel-pipe od.
 - C. Grooved-end-pipe couplings: ul 213 and awwa c606, rigid pattern, unless otherwise indicated; gasketed fitting matching steel-pipe od. Include ductile-iron housing with keys matching steel-pipe and fitting grooves, rubber gasket listed for use with housing, and steel bolts and nuts.

2.2 sprinklers

- A. Sprinklers shall be ul listed or fmg approved, with 175-psig minimum pressure rating.
- B. Manufacturers:
 - 1. Tyco fire protection.
 - 2. Reliable automatic sprinkler co., inc.
 - 3. Viking corp.
- C. Automatic sprinklers: with heat-responsive element complying with the following:
 - 1. UL 199, quick response, for nonresidential applications.
 - 2. UL 1767, for early-suppression, fast-response applications.
- D. Sprinkler types and categories: nominal 1/2-inch orifice for "ordinary" temperature classification rating, unless otherwise indicated or required by application.
- E. Sprinkler types, features, and options as follows:
 - 1. Concealed ceiling sprinklers, including cover plate.
 - 2. Flush ceiling sprinklers, including escutcheon.
 - 3. Pendent sprinklers.

4. Quick-response sprinklers.
 5. Recessed sprinklers, including escutcheon.
 6. Sidewall sprinklers.
 7. Upright sprinklers.
 8. Sprinkler escutcheons: materials, types, and finishes for the sprinkler mounting applications.
- F. Sprinkler heads to match existing. Replace escutcheons and cover plates for all existing to remain sprinklers in the area of work.

2.3 provide alternate unit pricing of the following

- A. Removal of ten (10) feet section of sprinkler pipe schedule 40 including sprinkler heads with the following diameters:

1. 1".....	\$.....
2. 1 1/4".....	\$.....
3. 1 1/2".....	\$.....
4. 2".....	\$.....
5. 2 1/2".....	\$.....
6. 3".....	\$.....

- B. Relocation of ten (10) feet section of sprinkler pipe schedule 10 including sprinkler heads with the following diameters:

1. 2".....	\$.....
2. 2 1/2".....	\$.....
3. 3".....	\$.....

Part 3 - execution

3.1 examination

- A. Examine walls and partitions for suitable thickness, fire- and smoke- rated construction, framing for hose station cabinets, and other conditions where hose connections and stations are to be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 piping applications, general

- A. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- B. The design and installation of all tenant improvements shall permit adequate accessibility to all new and existing equipment, for proper maintenance
- C. Hangers shall only be hung directly from structural steel. Where hangers cannot be supported directly from building steel, special permission and approval must be

obtained from the building and the landlord's structural engineer for alternate hanging method.

1. Alternate hanging method may attach to the structural slab above the tenant space subject to the following:
 - A. Hangers supporting loads of more than 100 pounds must be attached directly to beams.
 - B. Attachment to the slab shall utilize epoxy adhesive anchors.
 - C. Field tests must be performed utilizing the actual anchor proposed for use in the building. Field tests must be conducted as follows:
 - I. For areas of cinder concrete, the proposed anchors must have a minimum factor of safety of 8. Field tests shall be conducted for each 900 square feet of area (each bay with hangers).
 - Ii. For areas of stone concrete, the proposed anchors must have a minimum factory of safety of a minimum of 4 field tests shall be conducted for each floor.
 - D. Each hanger shall be attached to a mounting angle with minimum dimensions of 12x2x3/16. Each angle shall have at least two anchors. Anchors shall be spaced at least 5 inches apart.
 - E. For areas of stone concrete, double expansion shields may be used in lieu of epoxy adhesive anchors.
 - F. The minimum size of anchors shall be 3/8 inch.
 - G. Power and powder actuated fasteners will not be permitted. The intention is to provide support which in each case shall be amply strong and rigid for the load, but which shall not weaken or unduly stress the building construction

3.3 sprinkler system piping applications

- A. Nps 1-1/2 and smaller: threaded-end, black or galvanized (for pre-action or dry pipe), standard-weight schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.
- B. Nps 2 and larger: threaded-end, black or galvanized (for pre-action or dry pipe), standard-weight schedule 40 steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.
- C. Nps 2 and larger: grooved-end, black or galvanized (for pre-action or dry pipe), standard-weight schedule 40 steel pipe; grooved-end fittings; grooved-end- pipe couplings; and grooved joints. Note: contractor may submit alternate for schedule 10 piping; subject to owner approval.

3.4 joint construction

- A. Threaded joints: comply with nfpa 13 for pipe thickness and threads.

B. Grooved joints: assemble joints with listed coupling and gasket, lubricant, and bolts.

1. Steel pipe: square-cut or roll-groove piping as indicated. Use grooved-end fittings and rigid, grooved-end-pipe couplings, unless otherwise indicated.

2. Dry-pipe systems: use fittings and gaskets listed for dry- pipe service.

3.5 piping installation

A. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

B. Install unions adjacent to each valve in pipes nps 2 and smaller. Unions are not required on flanged devices or in piping installations using grooved joints.

C. Install flanges or flange adapters on valves, apparatus, and equipment having nps 2-1/2 and larger connections.

D. Install sprinkler piping with drains for complete system drainage.

E. Hangers and supports: comply with nfpa 13 for hanger materials.

1. Install standpipe system piping according to ibc and new jersey construction code.

2. Install sprinkler system piping according to ibc and nfpa 13.

F. Earthquake protection: install piping according to nfpa 13 and local code to protect from earthquake damage.

G. Fill wet-pipe sprinkler system piping with water. Coordinate all drain downs with building management. Drain downs to be performed after hours and a full fire watch shall be provided at the tenants costs during all drain down periods. Seismic conditions may require flexible connectors in piping.

3.6 sprinkler installation

A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels and tiles.

B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

3.7 connections

A. Install piping adjacent to equipment to allow service and maintenance.

B. Coordinate all drain downs with building management. Drain downs to be performed after hours and a full fire watch shall be provided at the tenants costs during all drain down periods.

3.8 labeling and identification

- A. Install labeling and pipe markers on equipment and piping according to requirements in nfpa 13 and in division 15 section "mechanical identification."

3.9 field quality control

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak test: after installation, charge system to 200 psig and test for 2 hours without any loss in pressure. Repair leaks and retest until no leaks exist.
 - 2. Flush, test, and inspect sprinkler systems according to ibc and nfpa 13, "systems acceptance" chapter.
 - 3. Flush, test, and inspect standpipe systems according to ibc "system acceptance" chapter.
 - 4. Coordinate with fire alarm tests. Operate as required.
 - 5. Verify that equipment hose threads are same as local fire department equipment.
- B. Report test results promptly and in writing to architect and authorities having jurisdiction.

9.10 cleaning and protection

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish. Protect sprinklers from damage until substantial completion.

9.11 demonstration

- A. Engage a factory authorized service representative to train owners maintenance personnel to adjust, operate and maintain specialty valves. Refer to division 1 section "closeout procedures"

Plumbing specifications

01000 - GENERAL REQUIREMENTS:

- A. The "general conditions of the contract for construction," aia document a201, latest edition, and these specifications as applicable are part of this contract.
- 1. Insurance: in accordance with building requirements and shall include a hold harmless clause for owner and engineer.
- B. Codes, permits and inspections:
 - 1. All applicable codes, laws and regulations governing or relating to any portion of this work are hereby incorporated into and made a part of these specifications, and their provisions shall be carried out by the contractor who shall inform the owner, prior to submitting a proposal, of any work or material which violates any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected by the contractor.
 - 2. The contractor shall give necessary notice, file drawings and specifications with the department having jurisdiction, obtain permits or licenses necessary to carry out this work and pay all fees therefore. The contractor shall arrange for inspection and tests of any or all parts of the work if so required by authorities and pay all charges for same. The contractor shall pay all costs for, and furnish to the owner before final billing, all certificates necessary as evidence that the work installed conforms with all regulations where they apply to this work.
- C. Site verifications
 - 1. Investigate each space through which equipment must be moved. Where necessary, equipment shall be shipped from manufacturer in sections of size suitable for moving through available restrictive spaces. Ascertain from building owner and tenant at what times of day equipment may be moved through all areas.
 - 2. The locations of the existing services are believed to be as indicated on the drawings. The contractor shall verify the actual location of these services and notify the engineer of any discrepancies prior to commencing any work.
 - 3. Submission of a proposal shall be construed as evidence that a careful examination of the portions of the existing building, equipment, etc., which affect this work, and the access to such spaces, has been made and that the contractor is familiar with existing conditions and difficulties that will affect the execution of the work. The contractor is responsible to indicate any discrepancies between the contract drawings and actual field conditions prior to submittal of bid. Submission of a proposal will be construed as evidence that such an examination has been made. Later claims shall not be made for labor, equipment or materials required because of difficulties encountered which could have been foreseen during such an examination. The on-site inspection shall verify existing pipe sizes, clearances, etc. And conditions.
- D. Contract documents

1. Prior to submission of the bid, this contractor shall review all drawings of the entire project including general construction, demolition, architectural mechanical, electrical, plumbing and sprinkler and shall include any work required in the bid which is indicated or implied to be performed by this trade in other sections of the work.
2. Drawings are diagrammatic and indicate general arrangement of systems and work. Pipe routing is shown diagrammatically and does not show all offsets, drops and rises of runs. The contractor shall allow in his price for routing of pipe to avoid obstructions. Coordination with the existing services, including those of other trades is required. Maintain headroom and space conditions.
3. If a conflict occurs in the specifications and/or on the drawings, the more stringent situation shall apply.
4. Any equipment, parts, materials, accessories, or labor that is necessary for proper performance of the mechanical work although not specifically mentioned herein or shown on the drawings, shall be furnished and installed without additional costs.
5. The base building drawings, plans, details, specifications and specification addenda are made part of this contract and shall apply to all work under the contract unless otherwise amended, modified, supplemented or specified herein.

E. Guarantee:

1. The contractor shall furnish a written guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within one year from the date of final certificate for payment and/or from date of actual use of equipment or occupancy of spaces by owner included under the various parts of the work, whichever date is earlier. This work shall be done as directed by the owner. This guarantee shall also provide that where defects occur, the contractor will assume responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by the contractor.
2. All material and equipment to be new unless otherwise noted and shall be in accordance with building standards and local building code. Certificates of inspection and approval.
3. Quality and gauge of materials: new, best of their respective kinds, free from defects and listed by underwriters laboratories, inc., or bearing their label. Materials and equipment of similar application shall be of same manufacturer, except as noted.
4. The final acceptance will be made after the contractor has adjusted his equipment, tested the various systems, demonstrated that it fulfills the requirements of the drawings and specifications and has furnished all the required.

F. Definitions:

1. "provide": to supply, install and connect up complete and ready for safe and regular operation the particular work referred to unless specifically otherwise noted.
2. "install": to erect, mount and connect complete with related accessories.

3. "furnish" or "supply": to purchase, procure, acquire and deliver complete with related accessories.
4. "work": labor, materials, equipment, apparatus, controls, accessories and other items required for proper and complete installation.
5. "wiring": raceway, fittings, wire, boxes and related items.
6. "concealed": embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
7. "exposed": not installed underground or "concealed" as defined above.
8. "similar" or "equal": equal in materials, weight, size, design and efficiency of specified product.

01100 - SCOPE OF WORK:

- A. Provide all labor, materials, equipment, services and fees necessary for complete and safe installation in conformity with the plumbing code and all other applicable industry, national and local codes and authorities having jurisdiction, as indicated on drawings and herein specified.
- B. Phasing as required by owner, construction manager, general contractor, or building management.
- C. Install work so as to be readily accessible for operation, maintenance and repair. Minor deviations from drawings may be made to accomplish this, but changes which involve extra cost shall not be made without approval.
- D. The contractor's proposal for all work shall be predicated on the performance of the work during regular working hours. When so directed, however, the contractor shall install work in overtime and the additional cost to be charged therefore shall be only the "premium" portion of the wages paid.
- E. Unless otherwise specifically specified, include all cutting and patching of existing floors, walls, partitions and other materials in the existing building. The contractor shall restore these areas to original condition.
- F. Removal and relocation of certain existing work will be necessary for the installation of the new work. All existing conditions cannot be completely detailed on the drawings. The contractor shall survey the site and include all changes in making up the work proposal.
- G. The contractor shall keep all equipment and materials, and all parts of the building, exterior spaces and adjacent streets, sidewalks and pavements, free from material and debris resulting from the execution of this work. Excess materials will not be permitted to accumulate either on the interior or the exterior.
- H. Seal openings through partitions, walls and floors with non-shrinking fire proof caulking or other noncombustible material.

- I. Provide all necessary flashing and counter flashing to maintain the waterproofing integrity of this building as required by the installation or removal of piping and equipment. Provide equipment curbs as required.
- J. Contractor shall prepare a list of all outstanding items and deficiencies for review prior to the engineers final walk through.

01310 - COORDINATION WITH BUILDING MANAGEMENT

- A. The work in the building shall be done when and as directed, and in a manner satisfactory to the owner. The work shall be performed so as to cause the least possible inconvenience and disturbance to the present occupants.
- B. Connections to existing work: install new work and connect to existing work with minimum interference to existing facilities. Temporary shutdowns of existing services shall be performed at no additional charges, at times not to interfere with normal operation of existing facilities and only with written consent of owner. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work. Connect new work to existing work in neat and acceptable manner. Restore existing disturbed work to original condition.
- C. All present material, equipment and construction debris to be removed under this contract shall become the property of the contractor with the exception of specific equipment and apparatus requested by the building representative, architect or as noted to be relocated on the drawings. Removed equipment shall be properly disposed of by this contractor.

01330 - SHOP DRAWINGS

- A. The contractor shall provide the engineer with all submittals required by the construction specifications and any requests for information (rfi). These documents shall be submitted electronically to submittalsdc@wbengineering.com, as well as the wb project manager.
- B. Indicate on each shop drawings submitted:
 1. Project name and location
 2. Name of architect and engineer
 3. Item identification
 4. Approval stamp of prime contractor
- C. Submissions:
 1. Submissions 11 in. X 17 in. Or smaller: if the submission is a catalog cut, the contractor shall submit one original and three copies. Otherwise, he shall submit three copies. The architect will forward the original and one copy (two copies when no original is received) to the engineer. All catalog cuts shall be complete.
 2. Submissions larger than 11 in. X 17 in.: submit two prints and one paper sepia to the architect. The architect will forward one print and the paper sepia to the engineer.
- D. Built drawings and equipment operational instructions

1. Upon completion and acceptance of work, contractor shall furnish written instructions and equipment manuals and demonstrate to the owner the proper operation and maintenance of all equipment and apparatus furnished under this contract.
2. These instructions shall be typed on 8-1/2 in. X 11 in. Paper and bound in three ring binders with clear acetate covers. Contractor shall give three copies of the instructions to the owner and one copy to the engineer.
3. The instruction booklet shall bear the name, address and telephone number of the project, architect and engineer.
4. Reproducible "as-built" drawings shall be provided indicating the as installed conditions of the work. "as-built" drawings shall be provided to the architect after completion of the installation in autocad r14 format.

01633 - SUBSTITUTIONS

- A. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications. Any changes in layout, electrical characteristics, structural requirements, or design due to the use of a substitution shall be submitted to the engineer as part of this proposal. The contractor takes full responsibility for the substitution and all changes resulting from substitution. All items shall be submitted for review in conjunction with the submittal of the substitution. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substituted item deviates from the specified item, those deviations are to be identified on a line by line basis. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted.
- B. All substituted equipment shall conform to space requirements and performance requirements shown on contract documents. Contractor shall replace any equipment that does not meet these requirements at his own expense. Any modifications to associated systems or additional costs attributed to this substitution shall be at this contractor's expense.
- C. Contractor shall submit bid based on specified items and shall supply as an alternate price any substitutions.

01731 - CHASING, CHOPPING OR CORE DRILLING

- A. Prior to any chasing, chopping, or core drilling being performed, this contractor shall field investigate existing conditions and coordinate with all appropriate trades and building management to ensure that work will be in harmony with other work and not affect any existing building systems. This work must be approved by building management prior to proceeding.

01732 - demolition, removal and relocation

- A. Removal, temporary connections and relocation of certain existing work will be necessary for the installation of the new systems. All existing conditions are not completely detailed on the drawings. The contractor shall survey the site and make all

necessary changes required based on existing conditions for proper installation of new work.

- B. Disconnect, remove and/or relocate existing material, equipment, and other work as noted or required for proper installation of new system.
- C. Equipment required to be temporarily disconnected and relocated shall be carefully removed, stored, cleaned, reinstalled, reconnected and made operational.
- D. All existing work not indicated for demolition shall be protected from damage. Where existing work to remain is damaged or disturbed, contractor shall repair or replace to owner's and building manager's satisfaction at no cost to the owner or building management.
- E. General contractor to remove all ceiling in areas where new piping is to be installed or existing is altered, as per architect's instructions.
- F. Necessary cutting and patching to accommodate the new work shall be performed by this contractor and coordinated with building management so as to minimize disruption of existing tenants and services. Upon completion of demolition, restore all items to match existing conditions.
- G. All existing material and equipment to be removed under this contract will remain the property of the owner or shall be legally disposed of by this contractor as directed by the architect or owner. Refrigeration contained in existing equipment to be removed shall be reclaimed or legally disposed of in accordance with epa requirements and ashrae.
- H. Provide for legal removal and disposal of all rubbish and debris from the building and site. Coordinate all demolition and removals with building management.

01735 - CONNECTIONS TO EXISTING WORK

- A. Plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing facilities. All system shutdowns affecting other areas shall be coordinated with building management. Install isolation valves at point of connection to the existing piping. Provide temporary ductwork and piping connections as required to minimize shutdown time.
- B. Connect new work to existing work in neat and approved manner. Restore existing work disturbed while installing new work to acceptable condition as determined by architect and building manager.
- C. Maintain continuous operation of existing facilities.

01781 - as-built drawings

- A. Contractor shall maintain record drawing prints on job site and record, at time of occurrence, deviations from contract documents due to field coordination, bulletins, or addenda.

- B. Contractor shall revise shop drawings to conform to record drawings and submit as-built condition drawings upon completion of the project. Final submission of reproducible as-built drawings are to be signed and certified by installing contractor that this is the as-built condition of the work. Contractor shall supply the record drawings in autocad r14 format.

01782 - MAINTENANCE MANUALS

- A. Submit four (4) loose-leaf bound operating and maintenance manuals with index and index tabs to include the following:
1. Operating and maintenance instructions on all systems.
 2. Manufacturers' catalog cuts on all equipment.
 3. Control systems with sequence of operations, catalog cuts of all devices, and point-to-point wiring diagrams.
 4. Piping as-built drawings with valve chart and key plan drawings inserted in binder.
 5. All items submitted for review in shop drawing section.

01785 - service and warranty (maintenance contract)

- A. This contractor shall provide as an add alternate price, a full one year service and warranty of all mechanical components and systems, with prices for years 2, 3 and 4 following this first year. At the time of acceptance of project, the tenant or owner's representative will decide to accept which alternate, if any.

08311 - ACCESS DOORS IN GENERAL CONSTRUCTION

- A. This contractor shall submit to the architect for approval a plan indicating the size (minimum 18"x 18") and location of all access doors required for operation and maintenance of all concealed equipment, devices, valves, and cleanouts. Contractor shall arrange for furnishing and installing of all access doors in finished construction and include costs in the bid.

22060 - HANGERS AND SUPPORTS

- A. Support all piping from building construction by providing inserts, beam clamps, steel fishplates (in concrete fill only), and acceptable brackets. Submit all methods for review.
- B. Provide trapeze hangers of bolted angles or channels for grouped lines and services.
- C. Provide additional framing where building construction is inadequate. Submit for review.
- D. Suspended horizontal piping:
1. Support all piping independently from structure using heavy iron-hinged type hangers, similar to grinnel clevis no. 260.
 2. Provide electroplated solid-band hangers similar to auto-grip, for two-inch and smaller pipe.

3. Provide wall brackets for wall supported piping and provide pipe saddles for floor mounted piping.
4. Provide supports with copper lining for uninsulated copper piping.
5. Suspend piping from inserts, using beam clamps with retain clamp or locknut, steel fishplates, cantilever brackets or other accepted means. Beam clamps shall be similar to grinnel figures 61, 87, 131, or 225.
6. Suspend piping by rods with double nuts.
7. Provide additional steel framing as required and accepted where overhead construction does not permit fastening hanger rods in required locations.
8. Support branch fixture water piping in chases with copper-plated metal brackets, secured to studs, similar to holdrite nos. 102-18, 107-18, 102-26, or 101-26.
- E. Provide 180 degree arc galvanized metal covering shields on hangers for insulated piping without incompressible insulating block in insulation at hangers.
- F. Maximum hanger spacing as indicated.
 1. Pipe 1 inch and smaller shall be every 8 feet.
 2. Pipe 1-1/4 inch and larger shall be every 10 feet.
 3. Copper tubing 1-1/4 inch and smaller shall be every 6 feet.
 4. Copper tubing 1-1/2 inch and larger shall be every 10 feet.
 5. Cast iron: every five feet and at every fitting or joint.
- G. Vertical piping:
 1. Provide spacing as indicated:
 - A. Threaded piping shall be every other floor level, at a maximum of 25 feet on centers.
 - B. Cast iron piping shall be every floor level, maximum 20 feet on centers; hubless pipe is the exception, requiring a maximum of 10 feet on centers.
 - C. Tubing shall be every floor level maximum ten feet on centers.
- H. Expansion anchors:
 1. Provide smooth wall, non-self-drilling internal plug expansion type anchors constructed of aisc 12l14 steel and zinc plated in accordance with fed. Spec. Qq-a-325 type 1, class 3.
 2. Do not exceed 1/4 of average values for a specific anchor size using 2000 psig (13,800 kpa) concrete only, for maximum working loads.
 3. Provide spacing and install anchors in accordance with the manufacturer's recommendations.
 4. Expansion anchors shall be u.l. listed and similar to hilti hdi.

22083 - PIPE INSULATION

- A. All insulation (including jacket, facing and adhesive) shall have composite fire and smoke hazard ratings as tested by procedures listed in astm e-84, nfpa 255 and ul 273; not exceeding a flame spread of 25 and a smoke developed of 50.
- B. On valves and fittings provide premolded fiberglass fittings. Vapor seal insulation on "cw".
- C. "cw" piping: provide 1/2 in. Thick fiberglass section pipe covering with vapor barrier jacket.
- D. "hw" piping: provide 1 in. Thick fiberglass sectional pipe covering.

22110 - VALVES

A. Gate valves:

- 1. Bronze rising stem, 200 psi wog; similar to stockham #b-105, b-109.

B. Ball valves:

- 1. Two-piece, bronze, end entry, 600 psi wwp; similar to stockham #s-216 br-r-t, #s-216 br-r-s.

C. Check valves:

- 1. Bronze, threaded cap, teflon disc; similar to stockham #b310t, b-320t.

22140 - DOMESTIC WATER PIPING

- A. Type I hard copper tubing with cast bronze or wrought copper fittings and 95/5 tin antimony solder joints.
- B. Standard weight red brass pipe with standard weight cast bronze threaded fittings.
- C. All exposed pipe and fittings shall be chrome plated brass.
- D. All exposed piping passing through walls, floors, ceilings, and partitions shall be provided with chrome plated cast brass escutcheons held in place with set screws.

22150 - SANITARY DRAINAGE AND VENT

- A. Service weight hub and spigot cast iron soil pipe and fittings with lead and oakum joints.
- B. Hubless cast iron soil pipe and fittings with extra wide heavy duty gasketed hubless couplings for food service applications.
- C. Galvanized schedule 40 steel pipe with galvanized threaded malleable iron fittings.

22410 - PLUMBING FIXTURES:

- A. Provide all fixtures with stop valves and supplies, fixture traps, and backflow prevention devices as required.
- B. All fixtures shall be as indicated on the architectural drawing.

22950 - TESTING, ADJUSTING AND BALANCING:

- A. Arrange and coordinate tests with local inspector and owner 48 hours in advance notify engineer and architect of test and date time.
- B. Domestic water piping:
 - 1. Test piping hydrostatically at a pressure of 125 psi.
 - 2. Duration of test shall be 2 hours without a loss in pressure.
- C. Drainage and vent piping:
 - 1. Cap all outlets and fill piping system to overflowing from a point at least 10 feet above the floor.
 - 2. The water level shall remain constant throughout the test duration of 30 minutes.

010000 - GENERAL REQUIREMENTS:

- A. Install all new work in a neat workmanlike manner readily accessible for operation, maintenance and repair.
- B. Codes, permits and inspections:
 - 1. All work shall comply with requirements of building management, and all authorities having jurisdiction. Applicable national, state, and local codes, laws, and regulations governing or relating to any portion of this work shall be incorporated into and made a part of these specifications. Contractor is to inform engineer of any existing work or materials which violate any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected at contractor's expense by this contractor and at no expense to the owner.
 - 2. This contractor shall obtain all equipment use permits as required by state and local authorities. Permits shall be turned over to owner at job completion.
- C. Site verification:
 - 1. Prior to submission of the bid, this contractor shall visit the job site to ascertain the actual field conditions as they relate to the work indicated on the drawings and described herein. Discrepancies, if any, shall be brought to the engineer's attention prior to submission of the bid, and if not resolved to satisfaction, shall be submitted as a written qualification of the bid. Submission of a bid shall be evidence that site verification has been performed as described above.
 - 2. Submission of a proposal will be construed as evidence that such an examination has been made and later claims will not be recognized for extra labor, equipment, or materials required because of difficulties encountered which could have been foreseen had such an examination been made. Any discrepancies shall be brought to the engineer's attention prior to bid. If discrepancies are not resolved to contractor's satisfaction they shall be qualified in their bid submission.
- D. Contract documents:
 - 1. Prior to submission of the bid, this contractor shall review all drawings of the entire project including general construction, demolition, architectural, mechanical, electrical, plumbing and sprinkler and shall include any work required in the bid which is indicated or implied to be performed by this trade in other sections of the work.
 - 2. Drawings are diagrammatic and indicate general arrangement of work and approximate location of equipment. Refer to architectural drawings for all dimensions and coordinate final locations of diffusers, grilles, registers, thermostats, sensors, switches and any wall mounted devices. All work shall be coordinated with other trades to avoid conflict. It is not intended to specify or to show every offset, fitting, or component. However, contract documents require components and materials whether or not indicated or specified as necessary to make the installation complete and operational. Final locations of diffusers, grilles, registers, thermostats, sensors, switches and any wall mounted devices shall be as per the architect. All work shall be coordinated with other trades to avoid conflict.
 - 3. If a conflict occurs in the specifications and/or on the drawings, the more stringent situation shall apply.

4. Any equipment, parts, materials, accessories, or labor that is necessary for proper performance of the mechanical work although not specifically mentioned herein or shown on the drawings, shall be furnished and installed without additional costs.
 5. The latest edition of aia documents general conditions of the contract for construction, or as required by the architectural documents and/or the structural engineer's documents are part of the contract.
- E. Guarantee:
1. All materials and workmanship shall be guaranteed for a period of one year from date of final acceptance of this work. Final acceptance shall be defined as the time at which the mechanical work is taken over and accepted by the owner, and is under care, custody, and control of the owner. Engage the services of various manufacturers supplying the equipment for the proper startup and operation of all systems installed. Provide formal training to the owners personnel in the proper operation and servicing of the system.
 2. The contractor shall guarantee to replace or repair promptly and assume responsibility for all expenses incurred for any workmanship and equipment in which defects develop within the guarantee period. This work shall be done as directed by the owner. This guarantee shall include responsibility for all expenses incurred in repairing and replacing work of other trades affected by defects, repairs or replacements in equipment supplied by this contractor.
 3. The replacement or repair shall be performed the same day of notification in an emergency fashion when notified by the owner or authorized representative. The contractor shall also repair all damage to surrounding work caused by the failure, repair or replacement of defective equipment.
 4. This contractor is responsible for the maintenance and operation of all systems until the final acceptance of the work.
 5. All air conditioning unit compressors and refrigeration components shall have a 5-year warranty.
 6. The "general conditions of the contract for construction" aia document a201, latest edition, or as required by the architect documents, and/or the structural engineer's documents, as applicable, are part of this contract.
- F. Definitions:
1. Mechanical contractor, "this contractor": the party or parties that have been duly awarded the contract for and are thereby made responsible for the mechanical work as described herein.
 2. "this contract", "the contract": the agreement covering the work to be performed by "this contractor".
 3. "approved", "equal", "satisfactory", "accepted", "acceptable", "equivalent": suitable for use on the project, as determined by the engineer based on documents presented for such determination.
 4. "these specifications": "this section, part, division" (of the specification): the document specifying the work to be performed by "this contractor".
 5. "the mechanical work", "this work": all labor materials, equipment, apparatus, controls, accessories, and other items required for a proper and complete installation by the mechanical contractor.

6. "architect", "engineer", "owner's representative": the party or parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
7. "furnish": purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the mechanical work.
8. "install": unload at the delivery point at the site and perform every operation necessary to establish secure mounting installation and correct operation at the proper location in the project, all as part of the mechanical work.
9. "provide": "furnish" and "install"
10. "new": manufactured within the past two years and never before used.
11. "relocate": move existing equipment and all accessories as required.
12. "remove": dismantle and cart away from site including all related accessories. All items shall be legally disposed of. All other equipment and operations in any way affected by the removal is to remain in full operation. Provide all necessary components to maintain such operation.

011000 - SCOPE OF WORK

- A. Provide all labor, materials, equipment, and contractor's services necessary for the complete, safe installation of all mechanical work. The scope of work shall include but not be limited to the following:
 1. Demolition and removal of items as required.
 2. Ductwork and ductwork accessories.
 3. Piping and piping accessories.
 4. Series fan powered vav boxes.
 5. Insulation of piping, equipment and ductwork.
 6. Commissioning
 7. Testing and balancing.
 8. Cutting and patching.
 9. Shop drawings.
 10. As-built drawings.
 11. Operating and maintenance manuals.
 12. Full coordination with other trades.
 13. Warranty and guaranty.
- B. Phasing as required by owner, construction manager, general contractor, or building management.
- C. Premium time for work to be performed after-hours as required by building management and/or owner to meet designated schedule
- D. Filing, permits, controlled inspections.
- E. Full testing and startup of all systems.
- F. Secure certificates, pay all fees and charges for all work installed, certifying compliance with all authorities. Contractor shall perform required controlled

inspection and obtain all equipment use permits. Deliver certificates to owner for signing before filing.

013100 - COORDINATION WITH BUILDING MANAGEMENT

- A. The contractor shall obtain a copy of the building rules and regulations prior to bid submission to determine requirements and the extent of premium time work required by the building. For the purpose of the bid, assume any noisy work (e.g., chopping, core drilling, etc.,) and base building system interruptions are to be performed outside normal business hours.
- B. The contractor shall adhere to the building owner's rules and regulations. Any discrepancies between the contract documents and the building rules and regulations shall be submitted in writing to the architect/engineer for review, with bid submission.
- C. Coordinate with building owner for any service interruption of existing systems and give notice as required by building rules and regulations or a minimum of two (2) days prior to any work, whichever is more stringent.

013300- SHOP DRAWINGS

- A. The contractor shall provide the engineer with all submittals required by the construction specifications and any requests for information (rfi). These documents shall be submitted electronically to submittalsdc@wbengineering.com, as well as the wb project manager. Include the wb project number 05bhd.150392 in the body of the email or subject line.
- B. Submit shop drawings certified by all trades that coordination has been completed. Submit all certified equipment cuts with construction wiring diagrams and automatic temperature control requirements. Shop drawings submission shall include, but not be limited to, the following:
 - 1. Ductwork - provide duct shop standards and leakage test certification, as required, and 3/8 scale duct layout.
 - 2. Piping layout and appurtenances - provide piping, valving, chemical treatment, shop standards and 3/8 scale piping layout with all valving.
 - 3. Insulation for ductwork and piping.
 - 4. Flexible duct
 - 5. Certified air and water balancing report.
 - 6. Equipment catalog cuts for all items to be utilized on project fans, pumps, air conditioning units, and vav boxes.
 - 7. Louvers and dampers
 - 8. Air outlets: diffusers, registers, and grilles.
 - 9. Automatic temperature control diagrams, devices and sequence of operation.
 - 10. Commissioning plan and checklists.
 - 11. Submittal schedule
- B. As-built drawing in redline markups at project completion showing the installed condition of work.

- C. Shop drawings shall be delivered electronically in portable document format (pdf). Specific job requirements may be more stringent and contractor is responsible to obtain requirements from construction manager, general contractor or architect.
- D. Wb will require 5 business days to review shop drawings. Shop drawings will not be reviewed in the field.

016000 - ACCESS DOORS IN GENERAL CONSTRUCTION

- A. This contractor shall submit to the architect for approval a plan indicating the size (minimum 18"x 18") and location of all access doors required for operation and maintenance of all concealed equipment, devices, valves, dampers and controls. Contractor shall arrange for furnishing and installing of all access doors in finished construction and include costs in the bid.

016330 - SUBSTITUTIONS

- A. Contractor shall submit bid based on specified items and shall supply as an alternate price any substitutions.
- B. No substitute material or manufacturer of equipment shall be permitted without a formal written submittal to the engineer which includes all dimensional, performance and material specifications. Any changes in layout, electrical characteristics, structural requirements, or design due to the use of a substitution shall be submitted to the engineer as part of this proposal. The contractor takes full responsibility for the substitution and all changes resulting from substitution. All items shall be submitted for review in conjunction with the submittal of the substitution. Any substitution must be submitted with an explanation why a substitution is being utilized. If the substituted item deviates from the specified item, those deviations are to be identified on a line by line basis. If the substitute is being utilized for financial reasons, the associated credit must be simultaneously submitted.
- C. All substituted equipment shall conform to space requirements and performance requirements shown on contract documents. Contractor shall replace any equipment that does not meet these requirements at his own expense. Any modifications to associated systems or additional costs attributed to this substitution shall be at this contractor's expense.

017329 - CHASING, CHOPPING OR CORE DRILLING

- A. Prior to any chasing, chopping, or core drilling being performed, this contractor shall field investigate existing conditions and coordinate with all appropriate trades and building management to ensure that work will be in harmony with other work and not affect any existing building systems. This work must be approved by building management prior to proceeding.

017350 - CONNECTIONS TO EXISTING WORK

- A. Plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing facilities. All system shutdowns affecting other areas shall be coordinated with building management. Install isolation valves at point of connection to the existing piping. Install isolation dampers at connection to existing ductwork. Provide temporary ductwork and piping connections as required to minimize shutdown time.
- B. Removal, temporary connections and relocation of certain existing work will be necessary for the installation of the new systems. All existing conditions are not completely detailed on the drawings. The contractor shall survey the site and make

all necessary changes required based on existing conditions for proper installation of new work.

- C. Connect new work to existing work in neat and approved manner. Restore existing work disturbed while installing new work to acceptable condition as determined by architect and building manager.
- D. Maintain continuous operation of existing facilities.

017823 - MAINTENANCE MANUALS

- A. Submit four (4) loose-leaf bound operating and maintenance manuals with index and index tabs to include the following:
 - 1. Operating and maintenance instructions on all systems.
 - 2. Manufacturers' catalog cuts on all equipment.
 - 3. Automatic temperature control systems with sequence of operations, catalog cuts of all devices, and point-to-point wiring diagrams.
 - 4. Certified final air and water balancing report.
 - 5. Commissioning reports and checklists
 - 6. Duct and piping as-built drawings with valve chart and key plan drawings inserted in binder.
 - 7. All items submitted for review in shop drawing section.

017839 - AS-BUILT DRAWINGS

- A. Contractor shall maintain record drawing prints on job site and record, at time of occurrence, deviations from contract documents due to field coordination, bulletins, or addenda.
- B. Contractor shall revise shop drawings to conform to record drawings and submit as-built condition (piping and ductwork) drawings upon completion of the project.

017850 - SERVICE AND WARRANTY (MAINTENANCE CONTRACT)

- A. This contractor shall provide as an add alternate price, a full one year service and warranty of all mechanical components and systems, with prices for years 2, 3 and 4 following this first year. At the time of acceptance of project, the tenant or owner's representative will decide to accept which alternate, if any.

018133 - SUSTAINABLE DESIGN REQUIREMENTS (LEED CERTIFICATION REQUIREMENTS)

- A. Insulation
 - 1. All fiberglass insulation products shall be manufactured from recycled glass with a minimum of 30% post consumer recycled content by weight. Contractor shall submit manufacturer's certification of recycled content for approval.
 - 2. All fiberglass insulation products used for piping or equipment insulation shall be formaldehyde free.
- B. Adhesives
 - 1. All adhesives on this project must not exceed the voc content limits of:

A. Adhesives, sealants and sealant primers: south coast air quality management district rule #1168 requirements in effect on january 1, 2003 and rule amendment dated october 3, 2003.

B. Aerosol adhesives: green standard gc-36 requirements in effect on october 19, 2000.

2. All adhesives used on this project shall be of the type having limited capability to emit volatile organic compounds. Each adhesive shall meet the following emission factor limits:

Total voc's 10.0mg/m3/hr.

Formaldehyde 0.05mg/m3/hr.

2-ethyl-1-hexanol 3.0mg/m3/hr

3. The contractor shall submit a cut sheet and msds sheet for each adhesive to be used in the building mechanical system, highlighting voc limits.

C. Sealants

1. All sealants used on this project must not exceed the voc content limits of:

A. Adhesives, sealants and sealant primers: south coast air quality management district rule #1168 requirements in effect on january 1, 2003 and rule amendment dated october 3, 2003.

B. Aerosol adhesives: green standard gc-36 requirements in effect on october 19, 2000.

2. All sealants used in mechanical systems shall be of the low volatile organic compound emitting type. All sealants shall have emission characteristics that do not exceed a voc limit of 250 g/l. The contractor shall provide a cut sheet and msds sheet for each sealant to be used in the building mechanical system highlighting voc limits.

D. Paints

1. All paints used for equipment and systems to be installed on this project shall comply with green seal product requirements. The voc emission characteristic for each paint must comply with voc limit of 150 g/l for non-flat paints and 50 g/l for flat paints.

E. Sheet metal ductwork

1. All sheet metal ductwork shall be fabricated from iron manufactured with a minimum recycled content of 20% post-consumer recycled content material by weight or 40% post-industrial recycled content material. Contractor shall submit certification of recycled content for approval.

024119 - DEMOLITION, REMOVAL AND RELOCATION

A. Removal, temporary connections and relocation of certain existing work will be necessary for the installation of the new systems. All existing conditions are not completely detailed on the drawings. The contractor shall survey the site and make all necessary changes required based on existing conditions for proper installation of new work.

B. Disconnect, remove and/or relocate existing material, equipment, and other work as noted or required for proper installation of new system.

- C. Equipment required to be temporarily disconnected and relocated shall be carefully removed, stored, cleaned, reinstalled, reconnected and made operational.
- D. All existing work not indicated for demolition shall be protected from damage. Where existing work to remain is damaged or disturbed, contractor shall repair or replace to owner's and building manager's satisfaction at no cost to the owner or building management.
- E. General contractor to remove all ceiling in areas where new ductwork or piping is to be installed or existing is altered, as per architect's instructions.
- F. Necessary cutting and patching to accommodate the new hvac work shall be performed by this contractor and coordinated with building management so as to minimize disruption of existing tenants and services. Upon completion of demolition, all supply ductwork must be patched and sealed. Restore all items to match existing conditions.
- G. All existing material and equipment to be removed under this contract will remain the property of the owner or shall be legally disposed of by this contractor as directed by the architect or owner. Refrigeration contained in existing equipment to be removed shall be reclaimed or legally disposed of in accordance with epa requirements and ashrae.
- 1. Provide for legal removal and disposal of all rubbish and debris from the building and site. Coordinate all demolition and removals with building management. This contractor shall visit the site and adjoining areas and examine the existing conditions to become familiar with them and to determine the difficulties which will affect the execution of the work of this contract. This contractor shall perform this prior to the submission of his proposal. Submission of a proposal will be construed as evidence that such an examination has been made and later claims will not be recognized for extra labor, equipment or materials required because of difficulties encountered which could have been foreseen had such an examination been made.
- 2. The demolition work shall include, providing all materials, all necessary extensions, connections, cutting, repairing, adapting and other mechanical work required, together with any required temporary connections to maintain service pending the completion of the permanent work. Notes and graphic representation shall not limit the extent of demolition required. Extent of demolition work shall be coordinated with the architect and building management.
- 3. Refer to architects plans for area of work.
- H. Scope of work
 - 1. Existing work interfering with new
 - A. All existing work required to remain but interfering with proposed new mechanical (as well as electrical and general construction work) shall be relocated and reconnected using materials conforming to standards of this contract.
 - 2. Removal of mechanical equipment ductwork and piping
 - A. Remove all existing air and water cooled, ceiling and floor mounted air conditioning units with all associated ductwork, terminal boxes, diffusers, grilles, hangers and accessories.
 - B. Remove all exhaust, return and transfer fans and associated ductwork.

- C. Remove all piping, valving and hangers associated with piping to be removed back to mains. Identify all piping by service type and cap at mains.
- D. Remove all noted pumps, valves and associated accessories.
- E. Remove all starters, disconnect switches, motors, control (both temperature and system control) back to main panels and cap at panel. Coordinate with electrical contractor before removal of any electrical powered equipment. Electrical contractor is to disconnect all power to such equipment
- 3. Removal of base building ductwork
 - A. All existing building fire dampers, fire/smoke dampers, duct mounted smoke detectors at supply and return air shafts to remain.
 - 3. Provide additional support for all existing ducts and piping to remain, which are affected by demolition of existing ceiling and partitions.
 - 4. Equipment required to be turned over to the owner shall be placed in a mutually acceptable location. All materials and equipment removed as a result of demolition shall be taken from the site and disposed of in accordance with applicable laws and environmental regulations.

230100 - MECHANICAL EQUIPMENT

- A. Provide all equipment and accessories of the sizes and capacities as scheduled and as indicated on the drawings.
- B. Install equipment in accordance with approved shop drawings, manufacturers recommendations, instructions, and all authorities having jurisdiction.
- C. Provide equipment supports and/or mountings as indicated on the drawing, in vibration specification and as follows:
 - 1. Ceiling mounted equipment - provide supports with approved suitable anchors suspended directly from building steel structure.
- D. Provide supplemental steel as required to adequately support the equipment load.
- E. Equipment shall be installed with vibration isolation, refer to vibration isolation section.
- F. Reuse of existing equipment:
 - 1. Existing system survey
 - A. Prior to start of construction, contractor to perform existing conditions survey of systems to be reused and prepare complete report indicating physical condition of units and accessories and note any repairs required beyond items included in design documents to restore equipment to a fully operational condition. Report to be submitted to engineer for review and any corrective action. Coordinate this work with any new or refurbishment work listed in the specifications or plans.
 - A. Provide a unit price list to be submitted with your bid for the repair of all internal components of all equipment to be reused as well as all accessories.
 - B. Upon completion of the project, the contractor shall warranty all reused equipment for one (1) year.

230523 - VALVES:

- A. Valves shall have name of manufacturer and guaranteed working pressure cast or stamped on bodies. Valves of similar type shall be by a single manufacturer. Valves located 7 feet or more above operating floor or platform shall be provided with chain operated handwheels, rustproof chain and chain guide. Gaskets and packings shall not contain asbestos.
- B. All valving and valve materials shall be suitable for the operating test and maximum pressure and temperature requirements of the piping system for which they are being utilized.
- C. All valving shall be rated as follows for each system type:

SYSTEM	PRESSURE RATING
HEATING HOT WATER	300 PSIG

- D. Valving shall be as shown on the drawings and include but not be limited to the following:
1. Ball valves, 4 inches and smaller: mss sp-110, class 150, 600-psi cwp, astm b 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for 1/2-inch valves and smaller and conventional port for 3/4-inch valves and larger; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections. Vinyl-covered steel lever handle with memory stop. Stem extension for valves installed in insulated piping.
 2. Globe valves, 2-1/2 inches and smaller: mss sp-80; class 125, 200-psi cwp, or class 150, 300-psi cwp; astm b 62 cast-bronze body and screwed bonnet, rubber, bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
 3. Globe valves, 3 inches and larger: mss sp-85, class 125, 200-psi cwp, astm a 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.
 4. Swing check valves, 2-1/2 inches and smaller: mss sp-80; class 125, 200-psi cwp, or class 150, 300-psi cwp; horizontal swing, y-pattern, astm b 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections.
 5. Swing check valves, 3 inches and larger: mss sp-71, class 125, 200-psi cwp, astm a 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
 6. All valve manufacturers shall be as listed or approved equal by the engineer.
 7. Valves used for throttling or controlling flow shall be globe, ball, or plug type valves. Ball valves shall be used for shut-off for sizes 2-1/2 and smaller. Butterfly valves shall be lug type and shall be used for shut-off for sizes 3" and larger. Butterfly valves shall not be used for modulating service or steam service.
 8. Control valves: refer to automatic temperature control section.

230529 - HANGERS AND SUPPORTS:

- A. Provide all pipe hangers, hanger rods supports, inserts, attachments, clamps, guides, supplemental steel and anchors as required to install piping system sized to accommodate the system loads. Hangers and supports are to be in accordance with mss recommendations.
- B. Provide insulated protective saddles for insulated piping.
- C. Piping shall be supported in accordance with recommendations of mss sp-69 and all applicable codes. All threaded rod is to be galvanized. Provide 2" vertical adjustment for all hangers. Provide additional supports at changes in direction, branch piping over 5 feet, and concentrated loads due to valves, strainers and other accessories.
- D. Hanger and supports shall be manufactured by grinnell or approved equal.

230548.01 - VIBRATION ISOLATION

- A. Furnish and install all necessary vibration isolators, vibration hangers, mounting pads, rails, etc., to isolate vibration and sound from being transmitted to the building construction. All vibration isolation products shall be specifically designed for their intended use.
- B. Manufacturer of vibration isolation equipment shall have the following responsibilities:
 - 1. Determine vibration isolator sizes and locations.
 - 2. Provide suitable piping and equipment vibration isolation systems.
 - 3. Guarantee specified isolation system attenuation and deflection.
 - 4. Provide installation instructions, drawings and field supervision to assure proper installation and performance. Starters shall be selected to suit motor running and starting characteristics.
- C. Isolation systems shall be manufactured by mason industries.

Mounting types:

- 1. Static deflection of isolators shall be a minimum of 90% efficient. Provide corrosion protection for equipment mounted outdoors.
- 2. Mounting of ceiling-supported fans, and air handling units - spring isolators - (type dnhs).
- 3. Support of piping in equipment rooms and where exposed on roof
 - A. Hanger rod isolators (type 30n) mountings.
 - B. Floor supported piping isolators (type slr).
 - C. Vertical riser piping anchor and guides (type ada).
- 9. Provide flexible connections between all fans and ductwork (refer to ductwork section for specifications).

230700.00 - INSULATION

- A. All insulation shall meet the requirements of astm, nfpa, and all authorities having jurisdiction. All mechanical insulation, (jacketing, coverings, adhesives, mastics, facings, tapes, etc.), shall have ratings not exceeding a "flame spread" of 25 or less and "smoke developed" index of 50 or less.

- B. Before applying insulation, all pressure and leak tests shall be completed and approved. Furnish and install as per manufacturers requirements.
- C. Insulation for fittings or accessories requiring servicing or inspection shall have insulation removable and replaceable without damage.

230700.01 - DUCT INSULATION:

A. General

- 1. Insulation shall be applied with mastics, adhesives, coatings, with covers, weather protection and other work as required by manufacturer's recommendations. Do not insulate sound lined ductwork. Materials shall meet requirements of adhesive and sealant council standards and smacna.

B. Concealed ductwork

- 1. Insulate supply and fresh air ducts and plenums in concealed spaces and return duct not in ceiling plenum with at least 1-1/2" thick 0.75 lb./cu. Ft. Fibrous glass duct wrap having a minimum r-value of 5.0, with foil-kraft flame resistant vapor barrier.

C. Exposed ductwork

- 1. Insulate exposed medium pressure supply air ducts (upstream of vav boxes or heat pumps), and exposed plenums with 1-1/2" thick, semi-rigid fibrous glass boards with factory applied fire retardant foil reinforced kraft vapor barrier facing having a minimum r-value of 5.0. Provide weld pins and vapor seal all joints with tape.
- 2. Exposed low pressure supply ductwork (downstream of the vav boxex or heat pumps) located within the space that it serves does not need to be insulated.

230700.02 - EQUIPMENT INSULATION

- A. Provide fibrous glass board, 2 inch thick, 6 lb. Density, foil-scrim kraft facing, vaporseal. Insulation shall be segmented to fit curvature of equipment.

B. Application and finish

- 1. Round equipment: band in place with 1/2 inch by .020 inch stainless steel bands on 12 inch centers. Flat or irregular shaped equipment: impale insulation on welded pins or clips on 12 inch centers.
- 2. Equipment with vapor barrier. Tack coat insulation with a full coat of vapor barrier fire-resistive mastic; embed a layer of glass fabric overlapping ends, then apply a full finish coat of fire-resistive mastic.
- 3. All equipment: apply hexagonal metal mesh and two 1/4 inch thick coats of hydraulic setting cement. Trowel to a smooth finish. Use corner beads on edges.
- 4. Apply a full coat of lagging cement, embed a layer of glass fabric and finish with a second coat of lagging cement.
- 5. Provide weatherproof finish as required for service.

- C. The insulation of all removable heads, manholes, inspection plates, access doors, etc., shall be installed in removable aluminum housing arranged in such a manner that it can easily be removed and replaced without any damage to the insulation.

- D. Provide insulation as described above including removable enclosures where required for the following equipment:

- 1. Condenser water expansion tanks.

2. Pumps (condenser water (when used in winter)

230700.03 - PIPE INSULATION:

- A. Fiberglass pipe insulation: one-piece molded sectional fiber glass insulation, conforming to astm c-547, class 1, 2, 3 to 850ef with 4 lb/cu. Ft. Density with a thermal conductivity of not over 0.23 at 75ef mean. Provide with factory-applied all service jacket and double adhesive self-sealing lap. Cold water pipe insulation jacket shall be of the continuous vapor barrier type. The insulation shall be similar to owens-corning fiberglass asj/ssl-ii pipe insulation.
- B. Insulation for fittings, flanges, and valves: provide insulation for fittings, flanges, and valves premolded, precut, or job fabricated of the same thickness and conductivity as used on adjacent piping.
- C. Provide insulation for piping, fittings, flanges and valves of the thicknesses listed below:

INSULATION THICKNESS FOR PIPE SIZES (INCHES)			
SERVICE	MATERIAL	<2"	>2-1/2"
HOT WATER SUPPLY & RETURN UP TO 220°F	FIBERGLASS	1-1/2"	2"

D. Outdoor piping

- 1. Insulation thickness for outdoor piping: insulation on outdoor piping shall be twice the thickness listed for indoor pipe but not more than 4".
- 2. Provide jackets made of 0.016" aluminum held with a friction type, z-lock and aluminum bands. Provide a moisture barrier lining.

230800 - SYSTEM COMMISSIONING

- A. Contractor's responsibilities for commissioning
 - 1. Prior to system acceptance the contractor shall be responsible to provide a complete demonstration and testing of all of the components of the mechanical systems including but not limited to the following:
 - A. Existing heat pumps,
 - B. New heat pumps.
 - C. Fluid cooler.
 - D. Pumps.
 - E. Crac units.

- F. Existing parallel fan powered boxes.
- G. New series fan powered boxes.
- H. Inline fans.
- 2. The contractor shall submit as a shop drawing prior to commissioning, relevant commissioning check lists and procedures for engineer's review. Operating functions shall be performed in the presence of a client's representative.
- 3. After completion of commissioning, contractor shall submit a complete package of commissioning checklists, and check, test and startup certificates from vendors.
- 4. Contractor shall provide a written statement stating that the full operation of all systems, functions and alarms have been demonstrated and are operational as well as a listing of all systems, alarms and functions that have been commissioned. (any additional costs arising from site visits or additional work as a result of incomplete commissioning by the contractor shall be the responsibility of the contractor).
- 5. This testing shall take place after having satisfactorily met the requirements of shop drawing acceptance.
- 6. Commissioning of the systems shall be scheduled before the space is occupied leaving enough time to correct system deficiency's and after shop drawing acceptance. All items shall be submitted for review and acceptance to the owner, owner's representative and engineer before final acceptance can take place.

232113 - HYDRONIC PIPING

- A. Provide all piping, fittings, valves, specialties, thermometers, and pressure gauges required for the operating and maximum pressure and temperature of the piping systems.
- B. All piping shall be new, standard size, free from scale or rust with ends capped for delivery and storage. Each length of piping shall be properly marked at the mill for proper identification with name or symbol of manufacturer.
- C. Provide labeling of all piping (both exposed and concealed) in accordance with ansi standards and color coded as per building management standards. Labels shall be securely fastened to piping with lettering of sufficient size for easy identification by operating personnel.

D. Pipe application schedule:

SERVICE	SIZE	MATERIAL	WEIGHT	STANDARD	SOCKET WELD
HOT WATER TO 220°F	<4"	HARD COPPER	TYPE L	ASTM A88	BRAZE OR SILVER SOLDER

Fitting materials and application schedule:

1. All fitting joint type shall be the same as the piping joint type required for service, based on the piping application schedule.
2. Fitting class shall meet the pressure and temperature requirement of the piping system based on its maximum operating pressure and temperature or test pressure, whichever is more stringent. Pressure and temperature ratings of a fitting shall be determined by its class and the corresponding ansi standard.
3. Fitting application table

PIPE MATERIAL	PIPE SIZE (INCHES)	JOINT TYPE	FITTING MATERIAL	FITTING CLASS
COPPER TUBING HARD DRAWN TYPE "K" OR "L"	<4"	SOLDER 15-5-80 SILVER PHOSPHOROUS COPPER AWS A5.8 OR BRAZING	WROUGHT COPPER	STANDARD

- E. Provide dielectric fitting at all piping connections joining dissimilar metals, such as steel and copper.
 1. All instrumentation (pressure gauges and thermometers) shall be rated for the same pressure and temperature as piping system and rated specifically for the same service as the piping. Pressure gauges are to be liquid filled with 1% accuracy. Select gauges and thermometers so that the working pressure and temperature are at the midpoint of the scale.
 2. Instruments shall be manufactured by weiss instruments or approved equal.
- A. Provide thermometers in piping as indicated on the drawings and at the inlet and outlet of each hydronic coil, heat exchanger and piece of equipment that involves a differential temperature.
- B. Provide pressure gauges in piping as indicated on the drawings and at suction and discharge of each pump and at inlets and outlets of each hydronic coil, heat exchanger and piece of equipment that involves a differential pressure.
 1. All piping shall be vented at high points and provided with associated drain valves at low points.
 2. Provide core drilled openings with pipe sleeves at all slab and shaft penetrations. Provide fireproofing as required to maintain wall, shaft and slab fire ratings.
 3. Provide waterproof sleeves (link seal (ls) type) at all exterior wall, floor penetrations and as required or as noted on plans.
 4. Provide labeling of all piping (both exposed and concealed) in accordance with ansi standards and color coded as per building management standards. Labels shall securely fastened to piping with lettering of sufficient size for easy identification by operating personnel.
 5. All piping shall be maintained at highest elevations possible so as not to interfere with existing operations and service/maintenance requirements.
 6. Connection to existing piping:

- A. Wet-taps: provide new wet-tap connections into piping systems as indicated on the plans. Provide all required equipment and materials such as a tapping machine, welding machine, full ported valve and a pressure containing fitting. Valve and pressure fitting shall be rated for the working pressure of the piping system. Wet-tap shall be performed by a qualified contractor who is specialized in performing this type of work. Contractors name shall be submitted to the owner, owner's representative, building management and engineer for approval prior to commencing work. Wet-tap coupon is to be turned over to building management.
7. Testing
- A. All piping shall be hydrostatically tested at 1-1/2 times the operating pressure. System shall hold pressure for 24 hours, during which time piping is to show no leaks. Piping which is not tight under the tests shall be taken down and reassembled. All testing shall be done using water as a test medium.
- B. Tests shall be conducted after completion and assembly of piping system, before any insulation or paint is applied to joints, including welds and prior to making the system operable. Insulating materials installed prior to the tests shall be removed.
- C. The mechanical contractor shall provide all necessary temporary piping connections, tees, valves, equipment, and labor to pressure test piping and equipment.
- D. Equipment that is not to be subjected to the pressure test shall be either disconnected from the system or isolated by a blank or similar means. Valves may be used for this purpose provided that valve closure is suitable for the proposed test pressure.
- E. Submit to the engineer and owner representative a record of test pressure applied to each piping system.

233113 - DUCTWORK

- A. All ductwork shall be fabricated and installed in accordance with smacna hvac duct construction standards - metal and flexible, latest edition, smacna hvac air duct leakage test manual, latest edition.
- B. Provide all supporting and hanging devices in accordance with smacna, international building code and all applicable local and national codes.
- C. Ductwork layout and routing is schematic and the mechanical contractor is responsible for all duct size changes and relocations to accommodate space and structural conditions. Offsets and transformations shall preserve the full inside cross-sectional area of ductwork shown on the drawings.
- D. Ductwork (new and existing to be reused) shall have pressure classification, sealing requirements and leakage testing in accordance with smacna and as listed below unless otherwise specified or shown on the drawings:
1. 4" class: all supply ductwork from discharge of air handling units to inlets of terminal boxes. Seal class "a", leakage class 6 (rectangular) or class 3 (round).
 2. 2" class: all other low pressure ductwork. Seal class "c", leakage class 24 (rectangular) or class 12 (round).
- E. Leakage testing

1. All testing shall be done in the presence of the engineer or owner's representative. The contractor is responsible for providing all collars, caps, electric power, etc. Necessary to perform the tests. The contractor is also responsible for scheduling the test no less than three (3) business days prior to its intended occurrence. Low pressure ductwork (2" class) shall be tested on an as-needed basis at the engineer's direction. Leakage test procedures shall follow the outlines and classifications in the smacna hvac duct leakage test manual. If specimen fails to meet allotted leakage level, the contractor shall modify to bring it into compliance and shall retest it until acceptable leakage is demonstrated. Tests and necessary repair shall be completed prior to concealment of ducts.
2. Contractor shall be responsible for providing all collars, caps, electric power, etc. Necessary to perform the tests. The contractor is also responsible for scheduling the test no less than three (3) business days prior to its intended occurrence. Low pressure ductwork (2" class) shall be tested on an as-needed basis at the engineer's direction. Leakage test procedures shall follow the outlines and classifications in the smacna hvac duct leakage test manual. If specimen fails to meet allotted leakage level, the contractor shall submit a recommendation and price to modify to bring it into compliance. Ductwork shall be retested. Until acceptable leakage is demonstrated. Tests and necessary repair shall be completed prior to concealment of ducts.

F. Materials:

1. Sheet metal: unless otherwise specified or indicated, ducts shall be constructed of hot-dipped galvanized sheetmetal with g60 commercial coating according to astm a653 & a924.
2. Flexible connections at fans shall be neoprene coated, flame retardant glass fabric (complying with nfpa 90), 30 oz./sq. Yd. With sewed and cemented seams.
3. The use of flexible ductwork is limited to the final 10 feet to the termination at an air outlet. The final connection to the air outlet shall be hard duct. All flexible ductwork shall have metal helix and shall be insulated, similar to flexmaster usa type 6m. Support per smacna standards.

G. Fabrication:

1. Conform to smacna requirements for metal thickness, reinforcing, joints, and sealing for maximum static pressures involved. All seams and joints shall be sealed and taped.
2. Elbows shall conform to smacna requirements and the following:
 - A. Provide long radius type with centerline radius minimum 1.5 times duct width. Provide short radius or square elbows where indicated or where required to fit restricted spaces. Provide turning vanes on all short radius and mitered elbows. Conform to smacna for the number of vanes for fittings.
3. Branch connections: provide 45 degree entry or conical taps. Provide radius type fittings for divided flow branches.

H. Acoustically lined ductwork:

1. Provide mat-faced glass duct liner, 1-inch thick, 2 lb/cf density. Duct dimensions indicated are clear (net) inside dimensions. For duct velocities greater than 2,000 fpm, face ductliner with 24 gauge perforated aluminum or galvanized steel, fully covering ductliner, and supported 12" on center. Do not externally insulate

acoustically lined ductwork. Conform to smacna requirements for installation.

Provide acoustically lined duct where listed below and/or shown on the drawings:

All transfer ducts

Within minimum 20 feet of all ac unit and heat pump discharges

Within minimum 20 feet of fan inlet and discharges

Within minimum 15' downstream of terminal boxes (vav and cav)

Within minimum of 15ft upstream and downstream of cabinet fans.

233300 - DUCTWORK ACCESSORIES

A. Volume dampers:

1. Dampers shall be galvanized steel or same material as duct construction. Conform to smacna hvac duct construction standards, latest edition, opposed blade type. Provide bearing at both ends of damper rod and quadrant, with lever and lockscrew, at one end. Install with levers accessible through insulation. Splitter damper or air extractors shall not be used on this project.
2. Where volume dampers are required to be installed in inaccessible ceilings, contractor to provide cable operated damper.
3. Provide manual balancing volume dampers as required to properly balance the air distribution system. If the locations of balancing dampers are not defined on the drawings, the following minimum standards shall govern:
 - A. Low pressure: all supply air main branches from trunk, each split, and all sub-branches from mains shall be provided with balancing dampers.
 - A. Low pressure: all exhaust and return branches from trunk, each split and all sub-branches from mains shall be provided with balancing dampers.

B. As noted on plans.

B. Duct access doors:

1. Conform to smacna with piano type hinges, two sash locks and door gaskets. Screwed access panels are not permitted. Provide removable access doors where door swing can not be accommodated.
2. Size: minimum 20" x 14" except ducts less than 16", one dimension 20" and the other dimension, 2" less than the duct width.
3. Provide access doors: at entering and leaving sides of coils in ducts; automatic dampers on linkage side, manual volume dampers 2 sq. Ft. And larger, fire dampers, smoke dampers, combination fire/smoke dampers, smoke detection heads, fan bearings enclosed in ducts, suction and discharge sides of ceiling mounted fans, filters, reheat coils, at all equipment requiring access and as indicated on drawings.

233713 - DIFFUSERS, GRILLES AND REGISTERS:

A. General

1. Grilles, registers and diffusers shall be tested in accordance with ashrae standard 70-1991 or latest edition. The manufacturer shall provide published performance data for all air inlets and outlets to be used on project as part of submission.

2. Mechanical contractor shall coordinate the location of diffusers, grilles and registers with other trades and with ceiling and wall construction. The mechanical contractor shall verify that all diffusers, grilles and registers are compatible with ceiling construction to which they are to be installed.
3. Coordinate all work with general contractor and refer to architectural drawings for exact location, lengths and for framing and mitering arrangements that may differ from those shown on hvac drawings. Provide all required general construction, framing, blocking, plastering and supports to match ceiling, soffit or wall construction as part of project.
4. Inlets and outlets shall handle air quantities indicated at operating velocities with sound pressure level not to exceed nc-30, unless noted otherwise.
5. Diffusers, grilles and registers shall be installed with faces set level and plumb and mounted tightly against mounting service.
6. All air inlets and outlets to be steel or aluminum if exposed to moisture unless otherwise indicated. Finishes shall be selected by architect.
7. Diffusers, grilles and registers shall be manufactured by titus or price.
8. Submit for approval a complete schedule of all air inlets and outlets to be used on project including manufacturers models, sizes, performance, accessories, acoustic information, finishes, etc., before release for fabrication. Note any deviations from specifications and schedules shall be indicated on submittal.

B. Air inlet and outlet devices

1. Provide diffusers, grilles and registers for supply, return and exhaust inlets and outlets, of the size, type, and design indicated on drawings.
2. All supply return and exhaust air inlets and outlets shall be provided with an opposed blade damper and grid (adjustable through the face) for trim balancing.
3. Supply registers shall have two sets of directional control blades.
4. Only 4 way diffusers shall be used, provide blank off sheetmetal baffle for all 1-way, 2-way and 3-way diffusers.
5. All linear diffusers shall be provided with cable operated opposed blade damper adjustable through the face of the diffuser. Dampers and plenum taps shall be spaced at a maximum of 4 feet on center. Provide diffusers with adjustable air pattern control vanes.

C. Light shields

1. All return air grilles and registers open to ceiling plenums to be provided with a light shield.
2. All inactive section lengths of linear diffusers or linear diffusers installed as return air openings to be provided with light shields.
3. Light shields shall be manufactured perforated metal sized to match openings.

230900 - AUTOMATIC TEMPERATURE CONTROLS

A. Connecting to existing atc system

1. General - where connecting to an existing automatic temperature control system, the proposed new system shall be fully compatible with the existing system. All

necessary gateways or interfaces required shall be furnished and installed by the contractor.

2. The base building control vendor is schneider electric.
3. Bms shall pick up all bms digital and analog outputs from equipment specifications and equipment sequences of operations
4. The bms contractor shall provide a dedicated panel, separate from the base building system, to monitor and control the data center equipment, including cracs, pumps, drycoolers, hydrogen purge system, generator, ats, ups, & pdus. The dedicated panel shall be capable of generating email alarms to tenant personnel (tbd). Coordinate with the tenants representative for alarm notifications. All other equipment will be on the base building system.
5. All temperature control systems and components under this subcontract are to be fully modulating type, except where noted otherwise. The system shall be complete in all respects including all associated control equipment, thermostats, control valves, valve actuators, damper operators, relays, pilot positioners, control wiring, control air piping, switches, interlock wiring, electrical or pneumatic control components and associated piping or wiring, appurtenances, etc., to provide the functions described in these specifications and plans, regardless of whether or not said device relay, etc., is specifically mentioned hereafter.
6. The system shall be supervised and checked out completely in all respects by competent mechanics, regularly employed by the manufacturer.
7. All controls must be the product of one manufacturer. All automatic control valves, sensors and damper operators shall be manufactured by the temperature control manufacturer.
8. The control systems shall be in accordance with the following description of system operations and/or detail information shown on the plans and as described herein.
9. The manufacturer of the automatic control equipment shall submit the following for approval
 - A. A schematic diagram of each control system which shall indicate the proper sequence of operation and range of the controls for all cycles.
 - B. A complete description of the automatic operation of each system. The description should include the duty of each thermostat, valve, switch, etc., incorporated in the control system with a schedule and illustration of all control instruments and equipment including control panels and devices for each system.
 - C. Cuts of all equipment including thermostats, control panels, front end computers, control valves, etc.
7. Install smoke detectors in main supply duct of all air handling systems greater than 2,000 cfm but less than 15,000 cfm. Signal from the building fire alarm system shall automatically shut down fans and close all associated combination fire/smoke dampers. Signal, interlock wiring, power wiring and final connections will be provided by the electrical contractor.
8. Fire smoke dampers shall be under the full control of the fire alarm system and operate in accordance with base building requirements.
9. Electric wiring:

- A. All electrical work (except for motor feeders, wiring between motors, motor controllers, feeder panels, fuses, circuit breakers and bus bars) required for the automatic temperature control system shall be provided by this contractor. Work shall include but not be limited to time switches, damper motors, damper switches, electric thermostats, electric relays, e/p switches, interlocking wiring, wire, conduit, etc.
- B. All 115 volt power required for control purposes shall be provided by the control contractor from a source established by the electrical contractor.
- C. The control manufacturer shall include wiring diagrams in his shop drawings submittals fully coordinated with the electrical contractors work. It shall be the automatic temperature control contractor's responsibility to provide all wiring and conduit as required to achieve the function called for in these specifications, conforming with local codes for material and installation. The electrical specification for the project electrical work is to be followed.
- D. Furnish a certificate indicating method of wiring compliance with local codes as part of first shop drawing submittal.

10. Room thermostat and switch locations

- A. All room thermostats and switch locations (whether shown on plans or not) shall be selected and submitted by the temperature control manufacturer for approval by the architect and engineer prior to actual installation.
- B. All room thermostats/sensors and switch locations shall be submitted for review by the architect and engineer prior to installation whether devices are shown on plans or not.

11. Control valves

- A. All automatic control valves shall be of the electronic type, unless otherwise noted, fully proportioning, unless otherwise specified, quiet in operation, and shall be arranged to fail safe in either a normally open or normally closed position, in the event of power failure. The open or closed position shall be as specified or as required to suit job conditions. Provisions shall be made for valves operating in sequence, with other valves or damper operators to have adjustable operating ranges and starting points to provide flexibility of adjustment in sequencing and throttling range. Modulating valves shall be provided with pilot positioners. Valves shall be sized by the temperature control manufacturer and guaranteed to meet the heating or cooling requirements as specified. All valve bodies shall have the same pressure characteristics as the pipe in which it is installed.
- B. Valves 2 inches and smaller unless otherwise specified shall have bronze bodies with screwed connections. Valves shall be fisher type ed, warren type 20/70, k&m series gcg, or as approved.

13. Automatic dampers

- A. Provide controls for all the automatic dampers, as specified in the ductwork section, and shown on the drawings.
- B. Control motors or actuators shall be of the electronic or pneumatic type, unless otherwise noted, of appropriate size and quantities to provide two-position or proportioning control action as specified.

- C. Specified proportioning type shall be equipped with pilot type positioners. Pilot positioners shall be selected for varied spring ranges and adjustable without dismantling positioner and control motor.
- D. Automatic dampers exposed to the elements shall have electric actuators with all required accessories.
- E. Where automatic dampers are to be used in line with fans, provide damper closing control with an adjustable time delay.

14. Control panels

- A. Furnish and install in the mechanical room, as herein specified, control panels of steel, with welded angle iron brackets, for wall or floor mounting.
- B. The basic background color of the panel shall be as approved by the architect and engineer.
- C. Panels should be fully enclosed, with hinged locking front door for each panel. The panel shall contain all controllers, relays, switches, etc. Provide engraved nameplates to label the controlled equipment and for each panel mounted control device. Plastic laminated control schematic drawings for the system shall be hung at each local control panel.
- D. Details of each of these panels shall be submitted for approval prior to fabrication. Locations of each panel are to be convenient for adjustment and service and all such locations are to be approved prior to installation.

230993 - SEQUENCE OF OPERATIONS:

- A. Series fan powered terminal units with reheat coil (fan powered box) (bms controlled)
 - 1. The series fan-powered air terminal unit shall operate to maintain a space temperature of 70 deg f (adjustable) in heating season and 75 deg f (adjustable) in cooling season. The unit shall be controlled via a thermostat located in the space.
 - 2. The terminal unit fan shall run continuously to provide constant airflow to the space.
 - 3. Upon a rise in space temperature, as sensed by the thermostat, the primary air damper shall modulate open to maintain space temperature at setpoint. At maximum primary air the fan shall deliver 100% primary air to the space.
 - 4. Upon a drop in space temperature as sensed by the thermostat, the primary air shall modulate closed to maintain space temperature at setpoint as this occurs, plenum air is induced to maintain constant airflow and to satisfy the space setpoint.
 - 5. If the space temperature setpoint is still not satisfied then the hot water coil control valve shall modulate open/close to maintain space temperature setpoint.

230593 - TESTING AND BALANCING

A. General

- 1. Testing and balancing work shall be performed by an independent nebb or aabc certified company (not associated with the hvac contractor). Contractor shall submit the name of the testing and balancing company at time of bid.
- 2. After all project hvac work is complete, tested and in full working order, the agency shall perform the balancing and testing of the project heating, ventilating and air conditioning systems.

3. Upon the completion of the air conditioning system, the balancing agency shall perform testing and balancing and compile all test data in a certified report and submit four (4) copies for review and approval to the engineer.
 4. The report shall include design and actual readings for all equipment and location plan indicating where all work has been performed, and methods of balancing and details of instruments used.
 5. If discrepancies exist in the report that require field verification, the testing and balancing company in the presence of the engineer shall visit the jobsite for field verification of the report.
 6. After submission of the field verified balancing report, the air balancing company shall return to the job site to perform two (2) occupant comfort balances as directed by the owner or engineer.
 7. The final report after the comfort balance is to be included in project operating and maintenance manual.
 8. The testing and balancing agency shall include as part of their work an extended warranty of 90 days after completion of test and balance work. The engineer at his discretion during the warranty period may request a recheck, or resetting of any equipment. The mechanical contractor and the balancing contractor shall provide the necessary technicians to facilitate this work.
 9. Balancing agency shall permanently mark all adjustment devices (valves, dampers, etc.,) to enable the setting to be restored.
- B. Air balancing
1. Hvac contractor shall ensure that a first set of air filters are in place, whenever fans are running and replaced with a new clean set of filters before testing is commenced.
 2. Test, adjust, replace sheaves, and balance all equipment and air distribution systems to provide air quantities indicated on plans within plus or minus 5 percent.
 3. Test report shall include, but not be limited to the following:
 - A. Flow, leakage class, temperature, static pressure of air at all trunk ducts serving areas of work.
 - B. Temperature of air leaving outlets at two (2) typical air outlets.
 - C. Quantity of air at each air inlet and outlet after balancing.
 - D. Provide for all fans, fan motor hp, amps, volts, fan rpm, cfm, inlet and discharge static pressure, sheave position.
 - E. Provide for all air conditioning units, supply cfm, outside air cfm, return air cfm, mixed air cfm. Provide outside air, mixed air and supply air temperatures (dry bulb - cooling and heating, wet-bulb-cooling.) Indicate unit operating mode during test.
 - F. Calibrate all new and existing to be reused terminal boxes (vav) as required to meet specified minimum/maximum cfm.
 - G. Listing of design and actual readings as well as all manufacturer's data for equipment.
- C. Water balancing

1. Test, adjust, and balance new and existing to be reused distribution systems to provide flow quantities indicated on the drawings within plus or minus 2 percent.
2. Place system in full automatic operation, with automatic controls set in accordance with design conditions, and allow water to reach design temperature and pressure.
3. All pipe testing shall be completed before commencing balancing.
4. Set zone or circuit balancing valves at each piece of equipment (pump, air handling unit, etc.), to handle the design flow.
5. Fan air handling units containing coils, check and adjust each unit to insure the proper volume of air is passing through the coils, while the balancing procedure is in progress.
6. The test report shall include but not be limited to the following:
 - A. The pressure drop across and flow at each piece of equipment and at each riser and main.
 - B. Test pumps and balance flow. Record the following on pump report sheets:
 - I. Pump identification and system served.
 - Ii. Suction and discharge
 - Iii. Running amps, and brake horsepower of pump motor under full flow and no flow conditions.
 - Iv. Pressure drop across pump in feet of water or psig and total gpm pump is handling under full flow conditions.
7. Provide flow diagrams indicating piping layout, flow balancing valves and where the reading of each individual piece of equipment has been taken.
8. Mark valve tag after balancing of each balancing valve to indicate position of valve.

SECTION 233600 - AIR TERMINAL UNITS

Part 1 - general

1.1 summary

A. Section includes:

1. Series fan powered air terminal units.

1.2 submittals

A. Product data: for each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.

B. Shop drawings: for air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring diagrams: for power, signal, and control wiring.

- C. Coordination drawings: reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension assembly members.
 - 2. Size and location of initial access modules for acoustic tile.
 - 3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- D. Field quality-control reports.
- E. Operation and maintenance data: for air terminal units to include in emergency, operation, and maintenance manuals.

1.3 quality assurance

- A. Electrical components, devices, and accessories: listed and labeled as defined in nfpa 70, by a qualified testing agency, and marked for intended location and application.
- B. Ashrae compliance: applicable requirements in ashrae 62.1-2004, section 5 - "systems and equipment" and section 7 - "construction and system start-up."

Part 2 - products

2.1 series fan-powered air terminal units

- A. Basis-of-design product: subject to compliance with requirements, provide product indicated on drawings or comparable product by one of the following:
 - 1. Krueger.
 - 2. Titus.
 - 3. Trane.
 - 4. Nailor.
- B. Configuration: volume-damper assembly and fan in series arrangement inside unit casing with control components inside a protective metal shroud.
- C. Casing: 0.032-inch aluminum, single wall.
 - 1. Casing lining: adhesive attached, 1/2-inch thick, coated, fibrous-glass duct liner complying with astm c 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to astm e 84.
- A. Cover liner with nonporous foil.
- 2. Air inlet: round stub connection or s-slip and drive connections for duct attachment.
- 3. Air outlet: s-slip and drive connections.
- 4. Fan: forward-curved centrifugal.
- 5. Access: removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
- 6. Airstream surfaces: surfaces in contact with the airstream shall comply with requirements in ashrae 62.1-2004.

- D. Volume damper: galvanized steel with peripheral gasket and self-lubricating bearings.
 - 1. Maximum damper leakage: ari 880 rated, 3 percent of nominal airflow at 3-inch wg inlet static pressure.
 - 2. Damper position: normally open.
- F. Velocity sensors: multipoint array with velocity sensors in cold-and hot-deck air inlets and air outlets.
- G. Motor:
 - 1. Comply with nema designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in division 23 section "common motor requirements for hvac equipment."
 - 2. Type: electronically commutated motor.
 - 3. Fan-motor assembly isolation: rubber isolators.
 - 4. Enclosure: open dripproof.
 - 5. Enclosure materials: cast aluminum.
 - 6. Efficiency: premium efficient.
 - 7. Motor speed: single speed.
- A. Speed control: infinitely adjustable with pneumatic-electric and electronic controls.
- H. Filters: minimum arrestance according to ashrae 52.1 and a minimum efficiency reporting value (merv) according to ashrae 52.2.
 - 1. Material: pleated cotton-polyester media having 90 percent arrestance and 7 merv.
 - 2. Thickness: 2 inches
- I. Hydronic coils: copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, and rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg f. Include manual air vent and drain valve

2.3 source quality control

- A. Factory tests: test assembled air terminal units according to ari 880.
 - 1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ari certification seal.

Part 3 - execution

3.1 installation

- A. Install air terminal units according to nfpa 90a, "standard for the installation of air conditioning and ventilating systems."
- B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
- C. Install wall-mounted thermostats.

3.2 connections

- A. Make connections to air terminal units with flexible connectors as indicated on drawings.

3.3 identification

- A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows.

3.4 field quality control

- A. Testing agency: engage a qualified testing agency to perform tests and inspections.
- B. Manufacturer's field service: engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
 - 1. Manufacturer's field service: engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- D. Tests and inspections:
 - 1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
 - 2. Leak test: after installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. Operational test: after electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Air terminal unit will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.5 startup service

- A. Perform startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
 - 3. Verify that controls and control enclosure are accessible.
 - 4. Verify that control connections are complete.
 - 5. Verify that nameplate and identification tag are visible.
 - 6. Verify that controls respond to inputs as specified.

3.6 demonstration

- A. Train owner's maintenance personnel to adjust, operate, and maintain air terminal units

SECTION 236353 - COMPUTER-ROOM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Ceiling-mounted computer-room air conditioners.

1.2 DEFINITION

- A. BAS: Building automation system.

1.3 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Computer-room air conditioners shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

CAPACITIES AND CHARACTERISTICS AS SHOWN ON DRAWINGS

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For computer-room air conditioners. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Wiring Diagrams: For power, signal, and control wiring.
- C. Color Samples: For unit cabinet, discharge grille, and exterior louver and for each color and texture specified.
- D. Coordination Drawings: Plans, elevations, and other details, drawn to scale, using input from Installers of the items involved.
- E. Field quality-control reports.

- F. Operation and Maintenance Data: For computer-room air conditioners to include in emergency, operation, and maintenance manuals.
- G. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. ASHRAE Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2007, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004.
- D. ASME Compliance: Fabricate and label water-cooled condenser shell to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

1.6 COORDINATION

- A. Coordinate layout and installation of computer-room air conditioners and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of computer-room air conditioners that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than 3 years from date of Substantial Completion.
 - 2. Warranty Period for Control Boards: Manufacturer's standard, but not less than 3 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan Belts: one sets for each belt-driven fan.
 - 2. Filters: one set of filters for each unit.

PART 2 - PRODUCTS

2.1 CEILING-MOUNTED UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by the Liebert Corporation
- B. Description: Self-contained, factory assembled, prewired, and field piped; consisting of cabinet, fan, filters, controls, and dual coil.
- C. Cabinet: Galvanized steel with baked-enamel finish, insulated with 1/2-inch- (13-mm-) thick duct liner.
 - 1. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2007.
- D. Supply-Air Fan: Forward curved, centrifugal, and directly driven by two-speed motor.
- E. Refrigeration System:
 - 1. Compressor: Hermetic, with oil strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
 - 2. Refrigeration Circuit: Low-pressure switch, manual-reset high-pressure switch, thermal-expansion valve with external equalizer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
 - 3. Refrigerant: R-407C.
 - 4. Refrigerant Evaporator Coil: Direct-expansion coil of seamless copper tubes expanded into aluminum fins.
 - a. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1-2007 and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.
 - 5. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1-2007 and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.
 - 6. Water-Cooled Refrigerant Condenser: With liquid-line stop valve and head-pressure-actuated, water-regulating valve.
 - a. Cooling Medium: water.

- F. Filter: 1-inch- (25-mm-) thick, disposable, glass-fiber media.
 - 1. Merv (ASHRAE 52.2): 8.
- G. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
- H. Control System: Unit-mounted panel with main fan contactor, compressor contactor, compressor start capacitor, control transformer with circuit breaker, solid-state temperature-control modules, time-delay relay, heating contactor, BMS interface card, and high-temperature thermostat. Provide solid-state, wall-mounted control panel with start-stop switch and adjustable temperature set point.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for hydronic piping systems to verify actual locations of piping connections before equipment installation.
- C. Examine walls, floors, and roofs for suitable conditions where computer-room air conditioners will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install computer-room air conditioners level and plumb, maintaining manufacturer's recommended clearances.[Install according to ARI Guideline B.]
- B. Suspended Computer-Room Air Conditioners: Install using continuous-thread hanger rods and spring hangers of size required to support weight of computer-room air conditioner.
 - 1. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration Isolation" Fabricate brackets or supports as required.
 - 2. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Install piping adjacent to machine to allow service and maintenance.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- B. Perform tests and inspections.
 - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 - 1. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - 2. After installing computer-room air conditioners and after electrical circuitry has been energized, test for compliance with requirements.
 - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Computer-room air conditioners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.
- F. After startup service and performance test, change filters and flush humidifier.

3.5 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

3.6

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain computer-room air conditioners.

26000 - General requirements

- A. All work shall comply with requirements of the national electrical code, local building code and building management rules and regulations. Contractor is to inform engineer of any existing work or materials that violate any of the above laws and regulations. Any work done by the contractor causing such violation shall be corrected at contractor's expense by this contractor and at no expense to the owner.
- B. All work shall be performed in accordance with the existing building construction standards.
- C. Prior to submission of bid, this contractor shall visit the job site to ascertain the actual field conditions as they relate to the work as indicated on the drawings and described herein. Discrepancies if any, shall be brought to the engineer's attention prior to submission of his bid, and if not resolved to satisfaction shall be submitted as a written qualification of the bid. Submission of a bid shall be evidence that site verification has been performed as described above. Request for additional compensation due to contractor's failure to examine the site prior to submission of bid shall not be considered.
- D. Drawings are diagrammatic and indicate general arrangement of work and approximate location of equipment. Refer to architectural drawings for all dimensions for final locations of equipment and devices, etc. Work shall be coordinated with other trades to avoid conflicts. If a conflict occurs in the specifications and/or on the drawings, the more stringent situation shall apply.
- E. Prior to submission of bid, this contractor shall review all drawings of the entire project including general construction, demolition, architectural, mechanical, electrical, and plumbing, and shall include any work required in the bid that is indicated or implied to be performed by this trade in other sections of the work.
- F. Any equipment, parts, materials, accessories, or labor that is necessary for proper performance of the electrical work, although not specifically mentioned herein, or shown on the drawings, shall be furnished and installed as if called for in detail without additional cost.
- G. All materials and workmanship shall be guaranteed for a period of one year from date of final acceptance of this work. Final acceptance shall be defined as the time that the electrical work is taken over and accepted by the owner, and is under care, custody, and control of the owner. Engage the services of various manufacturers supplying the equipment for the proper startup and operation and servicing of the equipment.
- H. All materials shall be new and shall conform to the standards of the underwriters' laboratories inc. Materials shall be fabricated in accordance with the specifications and approved rules and regulations of nema and shall bear the ul inspection label. Material and apparatus for like shall be by the same manufacturer.
- I. Provide all labor, materials, equipment and contractor's services necessary for complete, safe installation of all electrical work. The scope of work shall include, but not be limited to the following:
1. Disconnection and removal of electrical equipment as required for new installation, including all conductors and conduit back to their source. (see demolition note)

2. Providing of light fixtures and lamps including exit and emergency lighting and all associated components and branch circuiting. Provide fluorescent light fixtures with electronic ballasts class p, high power factor etl and cbm approved.
3. Providing of new raceway and conductors for lighting and power.
4. Cutting, channeling and chasing required to accommodate the electrical installation and rough patching.
5. Additions and modifications to existing electrical power distribution equipment and related feeders.
6. Providing of hvac power wiring and final connections to hvac equipment.
7. Providing of conduit, junction boxes, pull boxes, etc., required for the aforementioned equipment.
8. Maintenance and proper operation of existing base building systems within the contract area during construction in accordance with the requirements of building management.
9. Grounding of all equipment as required by national electrical code and as shown on the drawings.
10. Maintain continuity of existing circuiting to adjacent areas not affected by the new work.
11. Providing telephone/data and signal empty conduit, pullboxes, outlets, sleeves and fishwires.
12. Coordinate with building fire alarm maintenance contractor and provide all required additions and modifications to the existing building fire alarm system.
13. Providing receptacles, light switches, disconnect switches, fuses, dimmers, outlet boxes, contactors and other wiring devices including related branch circuit wiring.
14. Providing engraved lamicoid nameplates for new panelboards, switches, cabinets, motor starters, etc.
- J. Perform any noisy work (e.g., chopping, core drilling, demolition, etc.) And base building system temporary shutdowns outside of normal business hours on safe time (premium time). Safe time work shall be performed when and as directed by the building management.
- K. Follow the general conditions of the contract for construction aia document a201 latest edition, or as required by the architects documents and/or engineers documents.
- L. Submit shop drawings certified by all trades that coordination has been established. Submit all certified equipment cuts with construction wiring diagrams. Provide a minimum of six (6) copies of 8-1/2"x11" submissions and one (1) reproducible and one (1) print of all drawings.

Submit shop drawings for the following:

1. Fire alarm devices.
2. Lighting fixtures and lamps.
3. Switches and fuses.
4. Panelboards and circuit breakers.
5. Wiring devices.
6. Any other item that may be required by architect.

M. Submit four (4) loose-leaf bound operating and maintenance manuals with index and index tabs to include all shop drawings and operating and maintenance instructions on all systems.

N. Contractor shall revise drawings to conform to record drawings and submit as-built condition (devices, equipment, circuitry, etc.), drawings upon completion of the project. Final submission of reproducible and acad diskette of as-built drawings are to be submitted to the owner and wb engineers and consultants for review and records.

O. Substitute material or manufacturer of equipment shall not be permitted without a formal written submittal to the engineer that includes all dimensional, performance and material specifications. Any changes in layout, electrical characteristics, structural requirements, or design due to the use of a substitution shall be submitted to the engineer as part of this proposal. The contractor takes full responsibility for the substitution and all changes resulting from substitution.

P. Removal, temporary connections and relocation of certain existing work will be necessary for the installation of the new systems. All existing conditions are not completely detailed on the drawings. The contractor shall survey the site and make all necessary changes required based on existing conditions for proper installation of new work.

Q. Plan installation of new work and connections to existing work to insure minimum interference with regular operation of existing facilities. All system shutdowns affecting other areas shall be coordinated with building management. Provide temporary feeders, circuitry, etc., as required to minimize downtime.

R. Definitions:

1. "electrical contractor", "this contractor" - the party or parties have been duly awarded the contract for and are thereby made responsible for the electrical work as described herein.
2. "architect", "engineer", "owner's representative" - the party or parties responsible for interpreting, accepting and otherwise ruling on the performance under this contract.
3. "furnish" - purchase and deliver to the project site complete with every necessary appurtenance and support, all as part of the electrical work.
4. "install" - unload at the delivery point at the site and perform every operation necessary to establish secure mounting installation and correct operation at the proper location in the project, all as part of the electrical work.
5. "provide" - "furnish" and "install"

6. "relocate" - move existing equipment/devices/fixture and all accessories as required, including the extension of existing or providing new circuit/conductors/wiring as required.

7. "remove" - dismantle and cart away from site including all related accessories. All other equipment and operations in any way effected by the removal is to remain in full operation. Provide all necessary components to maintain such operation.

S. Acceptable manufacturers:

disconnect switches: ite, cutler hammer, ge or square "d"

Fuses: bussman, gould shawmutt

raceway: national wire products, triangle or republic

wire/cable: rome phelps dogge, general cable, simplex

panelboards: square 'd'.

junction/pull boxes: appletown electric, crouse hinds or o.z./ gedney co.

fire stop material: hilti, 3m (note: material must be acceptable to local ahj)

Fittings, couplings, bushings, connectors: oz gedney, burndy, nepco, thomas and betts

Abbreviations

A	amp/ampere	kva	kilovoltampere
Aff	above finish floor	kw	kilowatt
Ats	automatic transfer switch	ltg	lighting
Awg	american wire gauge	mcb	main circuit breaker
Cb	circuit breaker	kcmil	thousand circular
Ckt	circuit	mlo	main lugs only
Co	conduit only	mtd	mounted
Cu	copper	n	neutral
Disc	disconnect	nts	not to scale
E	existing	pb	pull box
Elec	electrical	pnl	panelboard
Em	emergency	pwr	power
Fa	fire alarm	sd	smoke detector
Fbo	furnished by others	swbd	switchboard
Gfi/gf	ground fault interrupter	typ	typical
Grd	grounduf		unfused
Hz	hertz	uon	unless otherwise noted
Ig	isolated ground	w	wire
Jb	junction box	wp	weatherproofe

26120 - Wire and cable

A. All conductors shall be copper, type thhn/thwn insulated. All conductors shall have 600 volt rated insulation. Conductors #10 awg and smaller shall be solid wire. Conductors and #8 awg and larger shall be stranded wire.

B. Metal clad cable (type mc) is permissible for concealed branch circuitry where permitted by code and building management.

C. Branch circuit wire size: the minimum wire size for branch circuit shall be #12 awg except 120 volt circuits over 80 feet in length shall be 10# awg. Refer to drawings for further wire sizing information.

- D. Provide all branch circuits with dedicated ground wires.
- E. Color coding of 120/208 volt wiring system:
 - 1. Black for a phase
 - 2. Red for b phase
 - 3. Blue for c phase
 - 4. White for neutral
 - 5. Green for equipment ground
- F. Color coding of 277/480 volt wiring system:
 - 1. Brown for a phase
 - 2. Yellow for b phase
 - 3. Orange for c phase
 - 4. White for neutral
 - 5. Green for equipment ground
- G. Provide flameproof identification tags in all junction boxes, pull boxes and panelboards for all feeders, branch circuit and control wiring. Tags shall identify conductor sizes, source and termination points.
- H. Install no more than 3 lighting or convenience branch circuits in one conduit or homerun unless otherwise noted.

26130 - Raceway

- A. Conduit for branch circuit shall be thin wall tubing (emt), with compression fittings sized per drawing, 3/4" minimum. (maximum 3 circuits per homerun except as noted). Use rigid galvanized steel conduit for fire alarm power riser.
- B. Flexible steel conduit may be used only for:
 - 1. Short connections where rigid conduit is impracticable.
 - 2. From outlet box to recessed lighting fixture: minimum 4 ft. Maximum 6 ft. Lengths.
 - 3. For final connection to motor terminal box. Transformers and other vibrating equipment: with polyvinyl sheathing and ground conductor. Minimum length 18 in. With slack. Connect ground conductor to enclosure or raceway at each end.
 - 4. For expansion joint crossings, cross at right angles and anchor ends.
 - 5. Connect ground conductor to enclosure or raceway at each end.
- C. Expansion fittings: install at right angles with clip centered in expansion joint. Provide length of runs in accordance with manufacturer's recommendations.
- D. Raceways passing through fire-rated construction: seal opening with fire sealant as required to maintain the existing fire rating.
- E. Provide fish or pull wire in all empty conduits over 10 feet long.
- F. Maintain ground continuity of all interrupted raceways with ground conductor.

G. All wiring within electrical closet and in buildings core ceilings shall be installed in conduit.

H. Install accessible junction and pullboxes clear of other trades and supported from building structure independent of conduit.

26130 - Pull boxes, junction boxes and outlet boxes.

A. Pullboxes, junction boxes and outlet boxes shall be manufactured from galvanized industry standard gauge sheet steel.

B. Provide pull boxes and junction boxes in long straight runs of raceway to assure that cables are not damaged when they are pulled, to fulfill requirements as to the number of bends permitted in raceway between cable access points, the accessibility of cable joints and splices, and the application of cable supports.

C. Pullboxes and junction boxes shall be sized so that the minimum bending radius criteria specified for the wires and cable are maintained.

D. All equipment, device boxes, junction boxes, pullboxes and outlet boxes shall be installed so as to allow access to the box. If necessary and approved by architect, provide access door or coverplates in areas where unobstructed access is not possible.

E. Use weatherproof boxes, junction boxes and devices for all required weatherproof installation.

26130 - Telephone and data empty conduit system

A. Provide labor, materials and services for a complete and safe installation in accordance with the contract documents and all applicable codes and authorities having jurisdiction for the system including the following:

1. Conduit
2. Pull boxes
3. Outlet boxes
4. Sleeves

B. Provide minimum 2" deep 2 gang outlet boxes. Devices by others.

C. All raceway shall be emt with bushed terminations at hung ceiling with fish wire (nylon cord).

26140 - Wiring devices

(submit samples to architect for approval prior to devices purchase)

A. Wiring devices shall be of the commercial specification grade. All devices and plates shall be plumb and flush mounted, unless otherwise noted.

B. Switches shall be 120/277 volts, rated at 20 amperes, quiet operation decora type, similar to leviton cat #5621 color and device plates as selected by architect.

- C. 20 amp receptacles shall be 125 volt decora nema 5-20r.
- D. All receptacles and coverplates color shall be as selected by architect u.o.n.
- E. All receptacles face plates shall be professionally (label maker) labeled with panel and circuit numbers.

26410 - Switches, fuses and circuit breakers

A. Switches shall be quick-break heavy duty in nema 1 enclosure, fused or unfused, as indicated on the drawings. Fuses for switches shall be current limiting type with an interrupting capacity of 200,000 rms amperes and of the continuous current rating as shown on the drawings.

B. Circuit breakers shall be 'thermal magnetic' type, quick-make, quick-break with non-welding contacts compensated for ambient temperatures and shall have a minimum short circuit rating of 10,000 amperes symmetrical for 120/280v panels and 14,000 amperes for 277/480v.

26511 - Lighting fixtures and lamps

(see architectural drawings for lighting fixtures specifications.)

A. Ballasts and lamps shall be energy efficient complying with the new york state energy code.

1. Provide complete light fixtures with associated lamps, mounting accessories etc. As per architects specifications. All emergency light fixtures shall meet new york city building code requirements.

B. Wiring:

1. Luminaire wiring: 600 volt, 302 deg f, type sff-2, beginning at separately mounted outlet permitted.

2. Splices: mechanical boring pressure connector or crimp connector, wire nuts not box.

3. Fixtures fed from more than one panel: separate neutral to each panel.

4. Flexible conduit connections for recessed fixtures, maximum length: 6 ft. 0 in.

C. Supports:

1. Individual fixtures: carry weight of fixture to building construction, clear of ducts or pipes.

2. Pendant-mounted fixtures: with conduit stems supported to ceiling framework self-leveling fittings.

D. Base bid manufactures

1. Base bid for lighting fixtures shall be based on manufacturers listed in lighting fixtures schedule.

E. Electronic ballasts

1. Provide ul listed class p, "a" sound rated ballasts with high power factor with required voltage and frequency.

2. Ballast to have a five (5) year warranty including reasonable replacement labor costs.

3. Third harmonics distortion shall be less than 10%.

4. Ballast to contain required filtering so as not to interfere with power line carrier system.

5. Ballast shall be rapid start, full light output.

F. Locations:

1. Locations on the drawings are diagrammatic.

2. Verify with architectural reflected ceiling drawings & coordinate space conditions with other trades.

3. Fixture rows shall be in straight lines except as noted. Fixture doors shall open from same side.

G. Mounting

1. For ceiling construction, refer to architectural drawings for finish schedules and refer to manufacturer's installation details and applicable codes for required fixture mounting accessories.

2. Verify all ceiling trims with architectural drawings.

H. Replace blemished, damaged or unsatisfactory fixtures as directed.

I. Replace lamps that fail during construction prior to owner's acceptance of space.

J. All fixtures that are existing to be reused shall be cleaned, relamped and re-ballasted. Any defective or damaged parts shall be repaired or replaced.

26600 -Fire alarm system

A. This section includes additions and modifications to the existing building fire alarm system.

B. Shop drawings:

1. Wiring diagrams: provide detailed wiring diagrams that differentiate between manufacturer installed and field-installed wiring. Include diagrams for equipment and for system with all terminals and interconnections identified.

2. Device address list: coordinate sequence of operations, final connections and system programming with the building fire alarm vendor. Their work shall be included as part of this contract.
- C. Manufacturer qualifications: manufacturer shall be the same as the base building.
 - D. Source limitations: obtain fire alarm system components through the building fire alarm maintenance contractor.
 - E. Compliance with local requirements: comply with national fire protection association (nfpa), local ordinances and regulations, requirements of authorities having jurisdiction and local building code.
 - F. Refer to fire alarm drawings for further requirements.