

# Estancia Amenity at Wiregrass Ranch

For Standard Pacific Homes

Pasco County, Florida

DESIGNED BY:



ERVIN  
LOVETT  
MILLER

BID/PERMIT ISSUE 9.13.13

**ESTANCIA AMENITY AT  
WIREGRASS RANCH**

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Legend:

ELM – Ervin Lovett & Miller, Inc.

LOWE – Lowe Structures, Inc.

P&H – Powell & Hinkle, Engineering

SUPPLEMENTARY CONDITIONS

1.01 DEFINITIONS AND ABBREVIATIONS

- B. Owner: The Owner – Standard Pacific Homes
- The term Owner referred to throughout these specifications means the Owner or his authorized representative.
- C. Project: The project is Estancia Amenity at Wiregrass Ranch.
- D. Architect: The Architect is ELM, Inc., 1035 Kings Avenue, Jacksonville, Florida 32207.
- E. Work: The term Work includes all labor necessary and all material and equipment incorporated or to be incorporated to produce the construction required by the Drawings and these Specifications.
- F. Contractor: The General Contractor
- G. NIC: The term NIC used throughout the drawings and these specifications means “not included in this contract”.
- H. Approved Equal and/or Acceptable: The term Approved Equal and/or Acceptable used throughout the drawings and these specifications means as approved by the Architect.

1.03 SUMMARY OF WORK

- A. Extent of work: The Contractor shall furnish labor, material, services and equipment to complete the work in accordance with the drawings and as specified herein.
- B. Work shall be performed in accordance with applicable Federal, State or local requirements. Reference to codes, specifications and standards shall mean the latest edition, amendment or revision of such reference in effect at the project location on the date of the contract.
- C. Office and Telephone: The contractor shall provide a temporary office and telephone for business use only at the project site.
- D. Damaged Facilities: The contractor shall repair and/or replace, at no expense to the owner, any damaged sections of existing streets, sidewalks, curbs, utilities and structures caused by work performed under this contract or incidental thereto, whether by his own forces or by his subcontractors or vendors.

1.04 CONSTRUCTION PROGRESS SCHEDULE

- A. The contractor shall prepare and submit, within 10 calendar days of the date of agreement, a graphic construction schedule showing the beginning and completion dates for each trade or subdivision of the work and delivery dates for major equipment items.

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- B. A current, updated copy of the schedule shall be included with each request for payment.

1.05 SITE ACCESS

- A. Access to the site or construction work on site shall at no time interfere with the functioning of adjacent businesses or cause damage to existing buildings, adjacent property or utilities.
- B. Work that occurs on public land must be coordinated by the Contractor with the governing authorities concerning the use of public streets and other said properties for the purpose of deliveries, access and construction.

1.06 BUILDING LAYOUT

- A. The contractor shall immediately, upon entering project site for purpose of beginning work, locate all general reference points and take necessary action to prevent their destruction; lay out his own work and be responsible for all lines, elevations and measurements of building, grading, utilities and other work executed by him under the contract.
- B. The contractor must exercise proper precaution to verify figures shown on the drawings before layout work and will be held responsible for any error resulting from his failure to exercise such precautions.

1.08 DRAWINGS AND SPECIFICATIONS

- A. The drawings and specifications are intended to be fully explanatory and supplementary. However, should anything be shown, indicated or specified on one and not the other, it shall be done the same as if shown, indicated or specified in both.
- B. Should either the drawings or the specifications and the General Conditions contradict each other in any point, or require clarification, the contractor must call the same to the attention of the Architect, and his decision shall be obtained prior to the submission of bids, otherwise the Architect's interpretation will govern the performance of the work and no allowances shall be made on behalf of the contractor for error or negligence on his part in this connection.
- C. Should any error or inconsistency appear in drawings or specifications, the contractor, before proceeding with the work, must make mention of the same to the Architect for proper adjustment, and in no case proceed with the work in uncertainty nor with insufficient drawings.
- D. The contractor and each subcontractor shall be responsible for verification of all measurements at the building before ordering any materials or doing any work. No extra charge or compensation shall be allowed due to differences between actual dimensions and dimensions indicated on the drawings. Any such discrepancy in dimensions which may be found shall be submitted to the Architect for his consideration before the contractor proceeds with the work in the affected area.
- E. Follow sizes in specifications or figures on drawings in preference to scale measurements.
- F. Where it is obvious that a drawing illustrates only a part of a given work or of number of items the remainder shall be deemed repetitious and so constructed.

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- G. Under the various sections of the specifications any descriptive heading or listing of work in the particular branch referred to are intended to recite generally to the contractor the principal items included and covered thereunder. Should such headings or descriptions above referred to fail to mention any item obviously necessary for the completion of that particular branch of the work, it shall not relieve the contractor of the responsibility of furnishing such items not specifically listed thereunder.
- H. The Owner reserves the right to alter or modify the drawings and specifications in any particular, and the architect shall be at liberty to make any reasonable amount of deviation in the construction detail or execution without in either case, invalidating or rendering void the contract. In case any such alteration or deviation shall increase or diminish the cost of doing the work, the amount to be allowed to the contractor or owner shall be such as may be equitable and justly determined.

1.09 INTERPRETATION OF CONTRACT DOCUMENTS

- A. If any person contemplating the submission of a bid for the proposed contracts is in doubt as to the true meaning of any part of the plans, specifications, or other proposed contract documents, he should submit a written request for interpretation thereof to the Architect. Any interpretation of the contract documents will be made only by ADDENDA duly issued to each person receiving a set of such documents. The Owner will not be responsible for explanations of the proposed documents, except as issued in accordance herewith.
- B. Any "Addenda" issued shall be acknowledged in the proposal and in closing a contract they shall become a part thereof.

1.10 PERMITS, UTILITIES, PROTECTION

- A. Permits, fees and licenses: The contractor shall obtain and pay for permits, fees and licenses as may be required to complete the work.
- B. Temporary utilities: The contractor shall arrange and pay for all temporary water, telephone and electricity used in the course of construction, including the use of permanent building water and electrical service, incidental to construction operations. Upon substantial completion of the work or occupancy of the building by the Owner, the cost of all utilities, from that date, shall be transferred or assigned to the Owner's account.
- C. Protection: The contractor shall arrange and pay for all fences or barricades for the protection of the public as required by local city ordinances, protection of the work or for safety consideration.

1.11 CLEANING UP

- A. The contractor shall at all times keep the premises free from accumulations of waste material or rubbish caused by his employees' work.
- B. Include cleaning mud and debris from streets used as access to and from the building site.

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- C. At the completion of the work, remove all rubbish, tools, scaffolding and surplus material from about the site of the work.

1.12 SANITARY FACILITIES

- A. The contractor will construct and maintain sanitary facilities for the use of his employees and the employees of all subcontractors engaged on these projects at each site.
- B. The contractor will provide drinking water from approved safe source.

1.13 PRECONSTRUCTION CONFERENCE

- A. Before starting any construction work on this project, a conference will be held in the Architect's office for the purpose of verifying general procedures, expediting shop drawings and schedules and to establish a working understanding between the parties concerned with this project.
- B. Present at the conference shall be representatives of the Owner, a responsible representative of the contractor, the contractor's job superintendent and representatives of the Architect.
- C. The contractor shall also instruct his plumbing, mechanical, and electrical contractors or their representatives to attend this meeting.
- D. The contractor shall bring to this meeting the following information:
  - 1. Contractor documents not yet submitted
  - 2. Proposed job progress schedule
  - 3. Complete list of proposed subcontractors and material suppliers for all phases of the work including those not previously submitted with the proposal.

1.14 TESTING AND INSPECTION

- A. Testing and inspection shall be paid for by the contractor, except where noted otherwise herein.
- B. The testing shall be performed by an independent testing laboratory approved by the owner.
- C. Distribution of tests, inspection and mill reports shall be sent to the parties concerned as follows:
  - 2 Copies to the Architect
  - 1 Copy to the Owner
  - (and a number as requested to the contractor and supplier)
  - 1 copy to county when applicable

1.15 AS-BUILT DRAWINGS

- A. The contractor shall, at his expense, provide as-built drawings as follows:
  - 1. If the contractor shall elect to vary from the contract documents and secures prior written approval of the architect and owner, for any phase of the work, other than those listed below, he shall record in a neat readable manner, all such variances on the prints furnished.



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2. Contractor shall provide as-built drawings for plumbing, heating, ventilating and air conditioning, electrical and fire protection work. The as-built drawings shall be maintained as the work progresses.
3. The following requirements apply to all as-built drawings:
  - a. They shall be maintained at the contractor's expense.
  - b. All such drawings shall be done carefully and neatly on a drawing set.
  - c. Additional drawings shall be provided as necessary for clarification.
  - d. They shall be kept up to date during the entire course of the work and shall be available upon request for examination for other parts of the work.
  - e. The as-built drawings shall be returned to the architect upon completion of the work and are subject to the approval of the architect.
  - f. An electronic set of as-builts shall be provided to the architect/owner.

1.16 SURVEYS

- A. Owner will provide boundary survey of the property. All other surveys, including but not limited to, foundation survey and final as-built survey will be provided at the expense of the contractor.

1.17 SUBMITTALS

- A. Shop drawings and submittal data: Where submittals are required by the technical sections of these specifications they shall be submitted in five (5) copies. In lieu of providing hard copies of submittals, an electronic copy may be provided for review.
  1. All shop drawings shall be reviewed and initialed by the general contractor before submitting same to the architect for his review.
  2. The contractor will be responsible for the accuracy of the shop drawings and for their conformity to the drawings and specifications, unless he notifies the architect in writing of any deviations at the time he furnishes the shop drawings.

- B. Samples: Where samples are requested by the technical sections of these specifications they shall be submitted in duplicate unless otherwise requested by the architect.

1.18 SITE VISIT

- A. The contractor shall visit the site of the proposed work to determine the physical limitations of access and working space and take responsibility for working within these limitations.
- B. The failure to visit the site and become acquainted with existing conditions shall in no way relieve the contractor from any contractual obligation.

1.19 DIFFERING CONDITIONS

- A. The contractor shall notify the architect, in writing, before disturbing any of the conditions listed in B and C herein, or similar conditions.

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- B. Any subsurface or latent physical conditions at the site differing materially from those shown on the drawings.
- C. Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in this project.

1.20 WARRANTY

- A. The contractor shall warrant that all materials and equipment furnished for the project will be new unless otherwise specified, and that all work will be of good quality, free from faults and defects and in conformance with the contract documents.
- B. All work not so conforming to these standards may be considered defective. If required by the architect, the contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.
- C. The warranty provided in this paragraph and elsewhere in the contract documents shall be in addition to and not in limitation of any other warranty or remedy required by law or by the contract documents.

1.21 MATERIALS AND EQUIPMENT

- A. Unless otherwise specified, all materials shall be new and of types, grades or classes as herein specified. All materials shall be free from defects impairing strength, durability or appearances.
- B. All materials shall be carefully handled to preclude damage and shall be properly stored at the site to prevent deterioration, injury or the intrusion of foreign matter. Damaged or deteriorated materials shall be promptly removed from the site.

END OF SUPPLEMENTARY CONDITIONS

## **SECTION 011000 - SUMMARY**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Work covered by the Contract Documents.
  - 2. Use of premises.
  - 3. Specification formats and conventions.

#### 1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Identification: Estancia Amenity at Wiregrass Ranch 12-48.3
  - 1. Project Location: Pasco County, Florida
- B. Owner: Standard Pacific Homes
  - 1. Owner's Representative: Mr. Tom Spence
- C. Architect: Ervin, Lovett & Miller
- D. The scope of work is defined by construction documents prepared by Ervin, Lovett & Miller, Nancy Short Interiors, Lowe Structures, Powell & Hinkle Engineering, WRA, Irr. Design and Wet Engineering.

#### 1.3 USE OF PREMISES

- A. General: Contractor shall have full use of premises for construction operations, including use of Project site, during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to retain other contractors on portions of Project and by the ongoing daily business and activities of current occupants of the existing buildings.
- B. Use of Site: Limit use of premises to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Owner Occupancy: Allow for Owner occupancy of Project site.
  - 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, emergency vehicles and employees and clients of existing businesses at all times. Do not use these areas for parking or storage of materials.
  - 3. Utilities: Relocation of utilities or components of utilities may require temporary interruption of services to existing building tenants. Any disturbance to existing tenants

will be coordinated with the Owner of the project to ensure a minimum of disruption or interruption of services.

#### 1.4 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
  - 1. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
  
- B. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  - 1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.
  - 2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
    - a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

PART 2 - **PRODUCTS** (Not Used)

PART 3 - **EXECUTION** (Not Used)

END OF SECTION 011000

## **SECTION 012100 - ALLOWANCES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements governing the following:
  - 1. Lump-sum allowances.

#### **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 when indicated.

#### **1.3 SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.
- B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### **1.4 COORDINATION**

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

#### **1.5 LUMP SUM ALLOWANCES**

- A. Allowance shall include cost of specific products and materials under allowance and shall include taxes, labor, installation, overhead, freight, profit and delivery to Project site.

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1.6 UNUSED MATERIALS

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.

**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

- A. Two tiered, recirculating cast stone fountain with fountain surround - \$20,000.00.
- B. Systems through building and site – Note, all components noted on the drawings shall be included within the base bid. The allowances listed are for additional components required to ensure a complete system.
  - 1. Sound System - \$20,000.00.
  - 2. Access Control System - \$30,000.00
  - 3. CCTV Conduit - \$8,000.00
  - 4. Communication, Data, Phones - \$8,000.00
  - 5. Security System - \$5,000.00
  - 6. Televisions - \$3,000.00

END OF SECTION 012100

## **SECTION 012200 - UNIT PRICES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for unit prices.
- B. See Division 01 Section "Allowances" for procedures for using unit prices to adjust quantity allowances.

#### **1.2 DEFINITIONS**

- A. Unit price is an amount proposed by bidders as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if 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: Refer to 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.

END OF SECTION 012200

## **SECTION 012300 - ALTERNATES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This 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. 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: Modify 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 modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates may be included at the end of this Section. Specification Sections referenced in the schedule contain requirements for materials necessary to achieve the work described under each alternate.



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**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION**

3.1 SCHEDULE OF ALTERNATES

- A. Pool Heaters – the pool heaters shall be listed as an additive alternate to the base bid. All electrical and plumbing infrastructure leading to and from the pool heaters shall be included as part of the base bid.
- B. Fiber Ductboard – provide a deductive alternate for the use of fiber ductboard in lieu of metal duct as described in the mechanical specification.
- C. Lightning Protection System - the lightning protection system as described in the electrical specification shall be listed as an additive alternate.

END OF SECTION 012300

## **SECTION 012600 - CONTRACT MODIFICATION PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. See Division 01 Section "Allowances" for procedural requirements for handling and processing allowances.

#### **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, as "Architect's Supplemental Instructions."

#### **1.3 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Within 20 days 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.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.

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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 Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

1.4 ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. 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. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner may reject claims submitted later than 21 days after such authorization.
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.

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1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, Contractor will prepare a Change Order for signatures of Owner and Contractor.

END OF SECTION 012600

## **SECTION 012900 - PAYMENT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

#### **1.2 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment form and Contractor's Construction Schedule.
  - 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the 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. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  - 3. Round Amounts to nearest whole dollar; total shall equal the Contract Sum.
  - 4. 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.
  - 5. 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.
  - 6. 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.

7. 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.
8. 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.
- 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: Progress payments shall be submitted to Architect by the day of the month indicated in the Agreement. The period covered by each Application for Payment is one month, ending on the day indicated in the Agreement.
- D. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- F. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. One copy shall include waivers of lien.
  1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is 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 final or full waivers.

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3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- H. 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. Submittals 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.
- I. Application for Payment at Substantial Completion: After issuing 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.
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.

END OF SECTION 012900

## **SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination Drawings.
  - 2. Project meetings.
  - 3. Requests for Interpretation (RFIs).
- B. See Division 01 Section "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 Contractor seeking interpretation or clarification of the Contract Documents.

#### **1.3 COORDINATION**

- 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 with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.



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- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's Construction Schedule.
  2. Preparation of the Schedule of Values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Project closeout activities.

#### 1.4 SUBMITTALS

- A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.
1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of the Contract Documents or standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on the Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect for resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

#### 1.5 PROJECT MEETINGS

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

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after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

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

- a. Tentative construction schedule.
- b. Critical work sequencing and long-lead items.
- c. Designation of key personnel and their duties.
- d. Procedures for processing field decisions and Change Orders.
- e. Procedures for RFIs.
- f. Procedures for testing and inspecting.
- g. Procedures for processing Applications for Payment.
- h. Distribution of the Contract Documents.
- i. Submittal procedures.
- j. Preparation of Record Documents.
- k. Use of the premises.
- l. Work restrictions.
- m. Responsibility for temporary facilities and controls.
- n. Parking availability.
- o. Office, work, and storage areas.
- p. Equipment deliveries and priorities.
- q. First aid.
- r. Security.
- s. Progress cleaning.
- t. Working hours.

3. Minutes: Record and distribute meeting minutes.

C. Progress Meetings: Conduct progress meetings at biweekly intervals. Coordinate dates of meetings with preparation of payment requests.

1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
  - a. 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) Work hours.
- 10) Hazards and risks.
- 11) Progress cleaning.
- 12) Quality and work standards.
- 13) Status of correction of deficient items.
- 14) Field observations.
- 15) RFIs.
- 16) Status of proposal requests.
- 17) Pending changes.
- 18) Status of Change Orders.
- 19) Pending claims and disputes.
- 20) Documentation of information for payment requests.

#### 1.6 REQUESTS FOR INTERPRETATION (RFIs)

A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.

1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned 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 interpretation and the following:

1. Project name.
2. Date.
3. Name of Contractor.
4. Name of Architect.

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5. RFI number, numbered sequentially.
  6. Specification Section number and title and related paragraphs, as appropriate.
  7. Drawing number and detail references, as appropriate.
  8. Field dimensions and conditions, as appropriate.
  9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  10. Contractor's signature.
  11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
- C. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow ten working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for coordination information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFIs or RFIs with numerous errors.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- D. 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.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. 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.

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7. Date Architect's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION** (Not Used)

END OF SECTION 013100

## **SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This 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. Submittals Schedule.
  - 3. Daily construction reports.
  - 4. Field condition reports.
- B. See Division 01 Section "Payment Procedures" for submitting the Schedule of Values.

#### **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 activities are activities on the critical path. They 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.
- E. Fagnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.
- F. Major Area: A story of construction, a separate building, or a similar significant construction element.

### 1.3 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. Arrange the following information in a tabular format:
  - 1. Scheduled date for first submittal.
  - 2. Specification Section number and title.
  - 3. Submittal category (action or informational).
  - 4. Name of subcontractor.
  - 5. Description of the Work covered.
  - 6. Scheduled date for Architect's final release or approval.
- B. Preliminary Network Diagram: Submit two opaque copies, large enough to show entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
  - 1. Submit an electronic copy of schedule, using software indicated, on CD-R, 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 three copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.
- E. Daily Construction Reports: Submit two copies at monthly intervals.
- F. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

### 1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

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

## **PART 2 - PRODUCTS**

### **2.1 SUBMITTALS SCHEDULE**

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.
  1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
  2. Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

### **2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
  1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal 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.
  3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
  4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
- 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.



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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.
  6. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- D. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.

## 2.3 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. Equipment at Project site.
  3. Material deliveries.
  4. High and low temperatures and general weather conditions.
  5. Accidents.
  6. Stoppages, delays, shortages, and losses.
  7. Meter readings and similar recordings.
  8. Orders and requests of authorities having jurisdiction.
  9. Services connected and disconnected.
  10. Equipment or system tests and startups.
- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. 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 monthly intervals, update schedule to reflect actual construction progress and activities.
  - 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 Actual Completion percentage for each activity.
  
- B. Distribution: Distribute copies of approved schedule to Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200

## **SECTION 013300 - SUBMITTAL PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. See Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
- C. See Division 01 Section "Closeout Procedures" for submitting warranties.
- D. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- E. See Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- F. See Division 01 Section "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of Owner's personnel.

#### **1.2 DEFINITIONS**

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

#### **1.3 SUBMITTAL PROCEDURES**

- A. 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 reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

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- B. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
    - 1. Initial Review: Allow 14 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 5 days for review of each resubmittal.
  
  - C. Identification: Place a permanent label or title block on each submittal for identification.
    - 1. Indicate name of firm or entity that prepared each submittal on label or title block.
    - 2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
    - 3. Include the following information on label for processing and recording action taken:
      - a. Project name.
      - b. Date.
      - c. Name and address of Architect.
      - d. Name and address of Contractor.
      - e. Name and address of subcontractor.
      - f. Name and address of supplier.
      - g. Name of manufacturer.
      - h. Submittal number or other unique identifier, including revision identifier.
        - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.
- 
- D. Deviations: Highlight, encircle, or otherwise specifically identify deviations from the Contract Documents on submittals.
- 
- E. Additional Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
  - 1. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

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- F. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
- 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.
- 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: Use only final submittals with mark indicating action taken by Architect in connection with construction.

## **PART 2 - PRODUCTS**

### **2.1 ACTION SUBMITTALS**

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- 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 printed 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 written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Manufacturer's catalog cuts.
    - e. Wiring diagrams showing factory-installed wiring.
    - f. Printed performance curves.
    - g. Operational range diagrams.
    - h. Compliance with specified referenced standards.
    - i. Testing by recognized testing agency.
  - 4. Number of Copies: Submit five copies of Product Data, unless otherwise indicated. Architect will return three or four copies. Mark up and retain one returned copy as a Project Record Document. At the contractor's option, and as the preferred method, an electronic copy of the Product Data may be submitted in lieu of the hard copies. The electronic copy will be marked and returned to the contractor electronically.

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- 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. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Notation of coordination requirements.
    - j. Notation of dimensions established by field measurement.
    - k. Relationship to adjoining construction clearly indicated.
    - l. Seal and signature of professional engineer if specified.
    - m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
  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 40 inches.
  3. Number of Copies: Submit five opaque (bond) copies of each submittal. Architect will return three or four copies. At the contractor's option, and as the preferred method, an electronic copy of the submittal may be submitted in lieu of the hard copies. The electronic copy will be marked and returned to the contractor electronically.
- 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 appropriate Specification Section.
  3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

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- a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location.
  1. Number of Copies: Submit three copies of product schedule or list, unless otherwise indicated. Architect will return two copies.
- F. Application for Payment: Comply with requirements specified in Division 01 Section "Payment Procedures."
- G. Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- H. 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.
  1. Number of Copies: Submit three copies of subcontractor list, unless otherwise indicated. Architect will return two copies.

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
  1. Number of Copies: Submit two copies of each submittal, unless otherwise indicated. Architect will not return copies. At the contractor's option, and as the preferred method, an electronic copy of the Informational Submittal may be submitted in lieu of the hard copies.
  2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be

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- signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: Comply with requirements specified in Division 01 Section "Quality Requirements."
  - B. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
  - C. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
  - D. Installer Certificates: Prepare 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.
  - E. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  - F. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
  - G. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
  - H. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
  - I. Product Test Reports: Prepare written reports indicating 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.
  - J. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
  - K. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
  - L. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads.



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Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

- M. **Manufacturer's Instructions:** Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.
- N. **Manufacturer's Field Reports:** Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
  - 1. Statement on condition of substrates and their acceptability for installation of product.
  - 2. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  - 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
- O. **Insurance Certificates and Bonds:** Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.

**PART 3 - EXECUTION**

**3.1 CONTRACTOR'S REVIEW**

- A. 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. **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 modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  - 1. No Exceptions Taken
  - 2. Make Corrections Noted

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3. Amend and Resubmit
  4. Rejected – See Remarks
- 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. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300

## **SECTION 014000 - QUALITY REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This 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.
- C. See Divisions 02 through 49 Sections for specific test and inspection requirements.

#### **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 used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Approved mockups establish the standard by which the Work will be judged.
- D. 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 industry standards.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

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- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.3 CONFLICTING REQUIREMENTS

- A. General: 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 uncertainties and 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 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Reports: Prepare and submit certified written reports that include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- 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.

## 1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. 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.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- 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 548; 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. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

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- I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
  1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Mockups shall be constructed so that all components of the mockup are available for review at the same time, with adjacencies similar to the actual finish work.
  5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  7. Demolish and remove mockups when directed, unless otherwise indicated.
  
- J. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Sections in Divisions 02 through 49.

1.6 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 reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
  
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  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.

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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 factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- 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.

1.7 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing 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 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. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000



## SECTION 014200 - 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": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

#### 1.2 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.

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- 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 Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- 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.

AA	Aluminum Association, Inc. (The)
AAADM	American Association of Automatic Door Manufacturers
AABC	Associated Air Balance Council
AAMA	American Architectural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists (The)
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	ACI International (American Concrete Institute)
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies, Inc. (The)
AF&PA	American Forest & Paper Association
AGA	American Gas Association
AGC	Associated General Contractors of America (The)
AHA	American Hardboard Association (Now part of CPA)

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AHAM	Association of Home Appliance Manufacturers
AI	Asphalt Institute
AIA	American Institute of Architects (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)
ALSC	American Lumber Standard Committee, Incorporated
AMCA	Air Movement and Control Association International, Inc.
ANSI	American National Standards Institute
AOSA	Association of Official Seed Analysts, Inc.
APA	Architectural Precast Association
APA	APA - The Engineered Wood Association
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems
API	American Petroleum Institute
ARI	Air-Conditioning & Refrigeration Institute
ARMA	Asphalt Roofing Manufacturers Association
ASCE	American Society of Civil Engineers
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	ASME International (The American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering

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ASTM	ASTM International (American Society for Testing and Materials International)
AWCI	AWCI International (Association of the Wall and Ceiling Industry International)
AWCMA	American Window Covering Manufacturers Association (Now WCSC)
AWI	Architectural Woodwork Institute
AWPA	American Wood-Preservers' Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Industry Association (The)
BICSI	BICSI
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International)
BISSC	Baking Industry Sanitation Standards Committee
CCC	Carpet Cushion Council
CDA	Copper Development Association
CEA	Canadian Electricity Association
CFFA	Chemical Fabrics & Film Association, Inc.
CGA	Compressed Gas Association
CIMA	Cellulose Insulation Manufacturers Association
CISCA	Ceilings & Interior Systems Construction Association
CISPI	Cast Iron Soil Pipe Institute
CLFMI	Chain Link Fence Manufacturers Institute
CRRC	Cool Roof Rating Council

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CPA	Composite Panel Association
CPPA	Corrugated Polyethylene Pipe Association
CRI	Carpet & Rug Institute (The)
CRSI	Concrete Reinforcing Steel Institute
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Cast Stone Institute
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals
FM Global	FM Global (Formerly: FMG - FM Global)
FMRC	Factory Mutual Research

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(Now FM Global)

FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.
FSA	Fluid Sealing Association
FSC	Forest Stewardship Council
GA	Gypsum Association
GANA	Glass Association of North America
GRI	(Now GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydraulic Institute
HI	Hydronics Institute
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAS	International Approval Services (Now CSA International)
IBF	International Badminton Federation
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IESNA	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGCC	Insulating Glass Certification Council

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IGMA	Insulating Glass Manufacturers Alliance
ILI	Indiana Limestone Institute of America, Inc.
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
MFMA	Maple Flooring Manufacturers Association, Inc.
MFMA	Metal Framing Manufacturers Association, Inc.
MH	Material Handling (Now MHIA)
MHIA	Material Handling Industry of America
MIA	Marble Institute of America
MPI	Master Painters Institute
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc.
NAAMM	National Association of Architectural Metal Manufacturers
NACE	NACE International (National Association of Corrosion Engineers International)
NADCA	National Air Duct Cleaners Association
NAGWS	National Association for Girls and Women in Sport
NAIMA	North American Insulation Manufacturers Association

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NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
NCPI	National Clay Pipe Institute
NCTA	National Cable & Telecommunications Association
NEBB	National Environmental Balancing Bureau
NECA	National Electrical Contractors Association
NeLMA	Northeastern Lumber Manufacturers' Association
NEMA	National Electrical Manufacturers Association
NETA	InterNational Electrical Testing Association
NFHS	National Federation of State High School Associations
NFPA	NFPA (National Fire Protection Association)
NFRC	National Fenestration Rating Council
NGA	National Glass Association
NHLA	National Hardwood Lumber Association
NLGA	National Lumber Grades Authority
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)
NRCA	National Roofing Contractors Association
NRMCA	National Ready Mixed Concrete Association
NSF	NSF International (National Sanitation Foundation International)
NSSGA	National Stone, Sand & Gravel Association
NTMA	National Terrazzo & Mosaic Association, Inc. (The)



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NTRMA	National Tile Roofing Manufacturers Association (Now TRI)
NWWDA	National Wood Window and Door Association (Now WDMA)
OPL	Omega Point Laboratories, Inc. (Now ITS)
PCI	Precast/Prestressed Concrete Institute
PDCA	Painting & Decorating Contractors of America
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America)
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SDI	Steel Deck Institute
SDI	Steel Door Institute
SEFA	Scientific Equipment and Furniture Association
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)
SGCC	Safety Glazing Certification Council
SIA	Security Industry Association
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)

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SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SMPTE	Society of Motion Picture and Television Engineers
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)
SPIB	Southern Pine Inspection Bureau (The)
SPRI	Single Ply Roofing Industry
SSINA	Specialty Steel Industry of North America
SSPC	SSPC: The Society for Protective Coatings
STI	Steel Tank Institute
SWI	Steel Window Institute
SWRI	Sealant, Waterproofing, & Restoration Institute
TCA	Tile Council of America, Inc.
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance
TMS	The Masonry Society
TPI	Truss Plate Institute, Inc.
TPI	Turfgrass Producers International
TRI	Tile Roofing Institute
UL	Underwriters Laboratories Inc.
UNI	Uni-Bell PVC Pipe Association
USAV	USA Volleyball
USGBC	U.S. Green Building Council
USITT	United States Institute for Theatre Technology, Inc.

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WASTEC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau
WCMA	Window Covering Manufacturers Association (Now WCSC)
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association)
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
WIC	Woodwork Institute of California (Now WI)
WMMPA	Wood Moulding & Millwork Producers Association
WSRCA	Western States Roofing Contractors Association
WWPA	Western Wood Products Association

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.

BOCA	BOCA International, Inc. (See ICC)
IAPMO	International Association of Plumbing and Mechanical Officials
ICBO	International Conference of Building Officials (See ICC)
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.
SBCCI	Southern Building Code Congress International, Inc. (See ICC)
UBC	Uniform Building Code

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(See ICC)

- 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.

CE	Army Corps of Engineers
CPSC	Consumer Product Safety Commission
DOC	Department of Commerce
DOD	Department of Defense
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FDA	Food and Drug Administration
GSA	General Services Administration
HUD	Department of Housing and Urban Development
LBL	Lawrence Berkeley National Laboratory
NCHRP	National Cooperative Highway Research Program (See TRB)
NIST	National Institute of Standards and Technology
OSHA	Occupational Safety & Health Administration
PBS	Public Building Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board

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USDA Department of Agriculture

USPS Postal Service

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.

ADAAG Americans with Disabilities Act (ADA)  
Architectural Barriers Act (ABA)

CFR Code of Federal Regulations

DOD Department of Defense Military Specifications and Standards

DSCC Defense Supply Center Columbus  
(See FS)

FED-STD Federal Standard  
(See FS)

FS Federal Specification

FTMS Federal Test Method Standard  
(See FS)

MIL (See MILSPEC)

MIL-STD (See MILSPEC)

MILSPEC Military Specification and Standards

UFAS Uniform Federal Accessibility Standards

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.

CBHF State of California, Department of Consumer Affairs Bureau of Home Furnishings and  
Thermal Insulation

CCR California Code of Regulations

CPUC California Public Utilities Commission

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TFS Texas Forest Service  
Forest Resource Development

PART 2 - **PRODUCTS** (Not Used)

PART 3 - **EXECUTION** (Not Used)

END OF SECTION 014200

## **SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. See Division 01 Section "Execution" for progress cleaning requirements.
- C. See Divisions 02 through 49 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

#### **1.2 DEFINITIONS**

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

#### **1.3 USE CHARGES**

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. 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 Service: Contractor provided.
- C. Electric Power Service: Contractor provided.

#### **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.

#### **1.5 PROJECT CONDITIONS**

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its

use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Pavement: Comply with Civil Engineering contract standards.
- B. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top rails.
- C. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- D. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.
- E. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."
- F. Gypsum Board: Minimum 1/2 inch thick by 48 inches wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
- G. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### **2.2 TEMPORARY FACILITIES**

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

### **2.3 EQUIPMENT**

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.



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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 testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

**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 Division 01 Section "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 municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

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- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service underground, unless otherwise indicated.
  - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. 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. At each telephone, post a list of important telephone numbers including police and fire departments, Contractor's home office, Architect's office, Owner's office and Principal subcontractors' field and home offices.
  - 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- J. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail in field office.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide noncombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
  - 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.

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2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
  3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
  4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."
- C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  2. Maintain access for fire-fighting equipment and access to fire hydrants.
- D. Parking: Provide temporary parking areas for construction personnel.
- E. 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 nor endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations.
- F. Project Identification and Temporary Signs: Provide Project identification and other signs in sizes indicated. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
1. Provide temporary, directional signs for construction personnel and visitors.
  2. Maintain and touchup signs so they are legible at all times.
- G. 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 Division 01 Section "Execution" for progress cleaning requirements.
- H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

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- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
- C. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. 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.
- E. 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. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- F. Site Enclosure Fence: Furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: Locate where indicated, or enclose entire project site.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.
- G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary 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.

3.5 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.

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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, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

## **SECTION 016000 - PRODUCT REQUIREMENTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This 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; product substitutions; and comparable products.
- B. See Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
- C. See Divisions 02 through 49 Sections for specific requirements for warranties on products and installations specified to be warranted.

#### **1.2 DEFINITIONS**

- A. Products: Items purchased 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, or where indicated as a product substitution, 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

### 1.3 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration or supply an electronic copy. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified material or product cannot be provided.
    - b. Coordination information, including a list of changes or modifications 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. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    - j. Cost information, including a proposal of change, if any, in the Contract Sum.
    - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 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 7 days of receipt of additional information or documentation, whichever is later.
    - a. Form of Acceptance: Change Order.
    - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

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- B. Comparable Product 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. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "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, product selected shall be 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. 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 ensure compliance with the Contract Documents and to ensure 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.



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3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. 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: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
  3. Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

**PART 2 - PRODUCTS**

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that 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.

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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. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. 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 product and manufacturer, provide the named product that complies with requirements.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
5. Available Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include a list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified 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 provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
  - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
  - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 PRODUCT SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect. When products are identified by name, bid the named product. Do not anticipate a substitution to be accepted.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  2. Requested substitution does not require extensive revisions to the Contract Documents.
  3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  4. Substitution request is fully documented and properly submitted.
  5. Requested substitution will not adversely affect Contractor's Construction Schedule.
  6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  7. Requested substitution is compatible with other portions of the Work.
  8. Requested substitution has been coordinated with other portions of the Work.
  9. Requested substitution provides specified warranty.

## 2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

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1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - **EXECUTION** (Not Used)

END OF SECTION 016000

## **SECTION 017300 - EXECUTION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. General installation of products.
  - 4. Progress cleaning.
  - 5. Starting and adjusting.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.
- B. See Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

#### **1.2 SUBMITTALS**

- A. Certificates: Submit certificate signed by land surveyor 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 three copies signed by land surveyor.
- 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.

**PART 2 - PRODUCTS** (Not Used)

**PART 3 - EXECUTION**

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
  - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit

to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
  - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 3. Inform installers of lines and levels to which they must comply.
  - 4. Check the location, level and plumb, of every major element as the Work progresses.
  - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- B. 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.
- C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- D. Final Property Survey: Prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that



adequate provisions are made for locating and installing products to comply with indicated requirements.

- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
  - 2. Allow for building movement, including thermal expansion and contraction.
  - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
  - 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.

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- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

### 3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

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

END OF SECTION 017300

## **SECTION 017700 - CLOSEOUT PROCEDURES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Inspection procedures.
  - 2. Warranties.
  - 3. Final cleaning.
- B. See Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
- C. See Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
- D. See Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- E. See Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
- F. See Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

#### **1.2 SUBSTANTIAL COMPLETION**

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

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

### 1.3 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
  2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report and warranty.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify 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.

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1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1.5 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch 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.
- 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.

### **PART 3 - EXECUTION**

#### **3.1 FINAL CLEANING**

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
  - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
      - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

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- m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - n. Replace parts subject to unusual operating conditions.
  - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  - r. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700



## **SECTION 017823 - OPERATION AND MAINTENANCE DATA**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Emergency manuals.
  - 2. Operation manuals for systems, subsystems, and equipment.
  - 3. Maintenance manuals for the care and maintenance of products, materials, and finishes and systems and equipment.
- B. See Divisions 02 through 31 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

#### **1.2 SUBMITTALS**

- A. Manual: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

### **PART 2 - PRODUCTS**

#### **2.1 MANUALS, GENERAL**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. 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, address, and telephone number of Contractor.
  - 6. Name and address of Architect.
  - 7. Cross-reference to related systems in other operation and maintenance manuals.

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- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. 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.
  - 1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  - 2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  - 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
  - 4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
    - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
- B. Descriptions: Include the following:
  - 1. Product name and model number.
  - 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.

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8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
- 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.

### 2.3 PRODUCT MAINTENANCE MANUAL

- 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 inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and 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.

### 2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- 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 maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
- D. Maintenance Procedures: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions that detail essential maintenance procedures:
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

### **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

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

END OF SECTION 017823

## **SECTION 033000 - CONCRETE WORK**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION**

- A. The General Requirements, Division 01 are hereby made a part of this section as if fully repeated herein.
- B. Provide all concrete work shown and specified including form work, reinforcing steel, placing and curing.
- C. All concrete for the project shall conform to requirements of ACI 301, except as modified by the Contract Documents.

#### **1.2 CODES AND STANDARDS**

- A. Concrete work shall conform to the following by American Concrete Institute (ACI) unless modified herein or on the drawings.
  - 1. ACI 301: Specifications for Structural Concrete for Buildings.
  - 2. ACI 302: Guide for Concrete Floor and Slab Construction.
  - 3. ACI 304: Guide for Measuring, Mixing, Transporting, and Placing Concrete.
  - 4. ACI 308: Standard Practice for Curing Concrete.
  - 5. ACI 309: Guide for Consolidation of Concrete.
  - 6. SP-66: ACI Detailing Manual
  - 7. ACI 318: Buildings Code Requirements for Structural Concrete.
  - 8. ACI 347: Guide to Formwork for Concrete
  - 9. ACI 117: Standard tolerances for Concrete Construction and Materials.
  - 10. CRSI: Manual of Standard Practice

#### **1.3 QUALITY CONTROL**

- A. Concrete Testing Service: The Contractor shall employ and pay an independent testing laboratory to perform concrete testing. Laboratory shall meet the requirements of ASTM C 1077 "Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and criteria for Laboratory Evaluation."

#### **1.4 SUBMITTALS**

- A. Shop Drawings: Submit for fabrication and placement of concrete reinforcement. Comply with SP-66 and CRSI "Manual of Standard Practice" showing bar schedules and arrangement of reinforcement.
- B. Mix Design Tests Reports: Submit testing facility reports for each proposed mix at least 10 days prior to start of work.
- C. Concrete Tests Reports: Submit laboratory test report for each concrete test specified herein.

Test results shall be reported in writing to the Architect-Engineer and Contractor on the same day that the tests are made. Reports of compressive strength tests shall contain the project title and A.E. File number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, location of concrete batch in the structure, design compressive strength and type of break for both 7-day tests and 28-day tests.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS**

#### **A. Concrete Materials:**

1. Portland Cement: ASTM C 150, Type I/II
2. Water: Clean and potable complying with ASTM C94
3. Air-Entraining Admixture: ASTM C 260
4. Water Reducing Admixture: ASTM C 494, Type A
5. Retarding Admixture: ASTM C 494, Type B
6. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
7. High-Range, Water-Reducing Admixture: ASTM C 494, Type F
8. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G
9. Plastizing and Retarding Admixture: ASTM C 1017, Type II
10. Chloride Ions: Do not use calcium chloride in concrete unless otherwise authorized in writing by the Architect-Engineer. Do not use admixtures containing chloride ions in excess of amount found in municipal potable water.

#### **B. Aggregates:**

1. Regular Weight Concrete: ASTM C 33.
2. Grout: ASTM C 404.

#### **C. Concrete Reinforcing:**

1. Reinforcing Bars: ASTM A 615, Grade 60, deformed
2. Plain-Steel Wire: ASTM A 82, as drawn
3. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
4. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet

#### **D. Anchor Bolts: Conform to ASTM F1554 Grade 36 unless otherwise indicated on drawings. Nuts shall conform to ASTM A563, hex nuts.**

#### **E. Vapor Retarder: Multi-ply reinforced polyethylene sheet, ASTM E 1745, Class A.**

#### **F. Curing Materials:**

1. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. When dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

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4. Water: Potable.
  5. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
  6. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- G. Preformed Joint Material: ASTM D 1752 Type I, II or III or ASTM D 1751. Provide Sealtight by W. R. Meadows or approved equal.
- H. Non-Shrink Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications. Grout shall have a minimum 28-day compressive strength of 5,000 psi.
- I. Form Materials:
1. Forms for Exposed Finish Concrete:
    - a. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed plywood faced or other acceptable panel-type materials, to provide continuous, straight smooth, exposed surfaces. Furnish in largest practicable sizes to minimize number of joints and to conform to joint system shown on drawings. Provide form material with sufficient thickness to withstand pressure of newly-placed concrete without bow or deflection.
    - b. Use overlaid plywood complying with U.S. Product Standard PS-1 "B-B High Density Overlaid Concrete Form", Class I.
  2. Forms for unexposed Finish Concrete: Form concrete surfaces which will be unexposed in finished structure with plywood, lumber, metal or other acceptable material. Provide lumber dressed on at least two edges and one side for tight fit.
  3. Form Coatings: Provide commercial formulation form-coating compounds that will not bond with, stain nor adversely affect concrete surfaces, and will not impair subsequent treatments of concrete surfaces to be cured with water or curing compound.

## 2.2 CONCRETE MIXES

- A. Comply with ACI 301 requirements for concrete mixes.
- B. All concrete shall have a 28 day compressive strength as shown on the drawings. All concrete mixes shall be proportioned by the field experience method or the laboratory trial method in accordance with ACI 318.
1. The maximum water/cement ratio shall be 0.5 for slab-on-grade and 0.55 for all other mixes.
  2. All concrete, unless otherwise indicated, shall be air-entrained with an air content of 5% with a tolerance of  $\pm 1\frac{1}{2}\%$ .
    - a. Do not allow air content of floor slabs to receive troweled finishes to exceed 3%.
- C. Slump: Grout for filling masonry cells and cavities shall have a slump of 9-1/2 inches  $\pm 1\frac{1}{2}$



inch. Concrete shall have a slump of 4-1/2 inches  $\pm$ 1-1/2 inch, except slab on grades shall have a maximum slump of 4 inches.

## 2.3 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and furnish batch ticket information.
  - 1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Vapor Retarder: Install, protect, and repair vapor-retarder sheets according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended adhesive or joint tape.
  - 2. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Formwork: Construct so that concrete members and structures are of correct size, shape, alignment, elevation and position. Chamfer exposed edges and corners of formed concrete 3/4 inch unless otherwise indicated. Conform to ACI 347. Design of formwork is the responsibility of the Contractor.
- C. Reinforcement: Locate and support with metal chairs, runners, bolsters spacers and hangers, in compliance with CRSI "Manual of Standard Practice." For support of reinforcing steel in slabs or beams exposed to view underneath, furnish plastic accessories or accessories having plastic-coated feet.
- D. Install welded wire fabric in as long lengths as practicable, lapping at least one mesh, + 6 inches.
- E. Joints: Provide construction, isolation and control joints as indicated or required. Locate construction joints so as to not impair the strength and appearance of the structure, at locations indicated or approved by the Architect/Engineer.
- F. Concrete Placement: Conform to ACI 304. Place concrete in a continuous operation with

- planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.
- G. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms. Conform to ACI 309.
  - H. Tolerances: Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
  - I. Cold Weather Placing:
    - 1. Protect concrete work from physical damage or reduced strength which could be caused by frost, freezing actions, or low temperatures, in compliance with ACI 306 and as herein specified. When air temperature has fallen to or is expected to fall below 40 degrees F., uniformly heat all water and aggregates before mixing as required to obtain a concrete mixture temperature of not less than 50 degrees F., and not more than 80 degrees F. at point of placement.
    - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
    - 3. Do not use calcium chloride, salt and other materials containing antifreeze agents or chemical accelerators, unless otherwise accepted in mix designs.
  - J. Hot Weather Placing: When hot weather conditions exist that would seriously impair the quality and strength of concrete, place concrete in compliance with ACI 305 and as herein specified.
    - 1. Wet forms thoroughly before placing concrete.
    - 2. Do not use retarding admixtures unless otherwise accepted in mix designs.
  - K. Shoring shall remain in place until concrete has obtained 2/3 of the design strength, as determined by laboratory tests.

### 3.2 FINISH FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ½ inch.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch.
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following rubbed finish, defined in ACI 301, to smooth-formed finished as-cast concrete where indicated:
  - 1. Smooth-rubbed finish.
  - 2. Gout-cleaned finish.

3. Cork-floated finish.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.3 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1 for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes.
  1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, Portland cement terrazzo, and other bonded cementitious floor finishes.
  2. Tolerance: ½ inch in 10 feet when tested with a 10 foot straightedge.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.
  1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, equipment slabs, non-traffic exterior slabs, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
  2. Tolerance: 5/16 inch in 10 feet when tested with a 10 foot straightedge.
- D. Troweled Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
  2. Finish and measure surface so gap at any point between concrete surface and an unlevelled freestanding 10-foot long straightedge, resting on two high spots and placed anywhere on the surface, does not exceed ¼ inch.
- E. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
  1. Immediately after float finishing, slightly roughen trafficked surface by brooming

with fiber-bristlebroom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.4 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
- D. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water
    - b. Continuous water-fog spray
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subject to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.5 CONCRETE TESTING

- A. Compressive strength Tests: Conform to ASTM C31 and ASTM C39. One set of four cylinders for each 100 c.u. yds., or fraction thereof, of each strength concrete placed in any one day. Test one specimen at seven days; test two specimens at 28 days and hold one in reserve.
- B. Slump Tests: Conform to ASTM C143. Perform one test for each load point of discharge and one for each set of compressive strength test specimens.

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END OF SECTION 033000

## **SECTION 042000 - UNIT MASONRY**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes unit masonry assemblies consisting of the following:
  - 1. Concrete masonry units (CMUs).
  - 2. Face Brick
- B. See Division 07 Section "Sheet Metal Flashing and Trim" for furnishing manufactured reglets installed in masonry joints for metal flashing.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement.
- C. Samples: For each type and color of exposed masonry units.
- D. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
  - 1. For masonry units include material test reports substantiating compliance with requirements.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

#### **1.3 QUALITY ASSURANCE**

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency to perform preconstruction testing indicated below. Payment for these services will be made by Owner.
  - 1. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
  - 2. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019.
- B. Mockups: Build brick mockups to verify selections made and to demonstrate aesthetic effects.

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1. Build (2) brick panels minimum 48" x 48" to demonstrate the two brick selections that are being considered. Provide colored mortar as selected from manufacturer's full range.

1.4 PROJECT CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

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

2.2 CONCRETE MASONRY UNITS (CMUs)

- A. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Concrete Masonry Units: ASTM C 90.
  1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2000 psi .
  2. Weight Classification: Normal weight.

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2.3 CONCRETE AND MASONRY LINTELS

- A. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below.
- B. Concrete Lintels: Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.
- C. Masonry Lintels: Made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

2.4 BRICK

- A. General: Provide shapes indicated and as follows:
  - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  - 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view. Provide shapes as indicated in the contract documents for column capitals and caps of walls.
- B. Face Brick: ASTM C 216
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3,000 psi.
  - 2. Initial Rate of Absorption: Less than 30 g/30 sq. in.
  - 3. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced".
  - 4. Size (Actual Dimensions): 3 5/8 inches wide by 2 1/4 inches high by 8 inches (or as manufactured for selected products).
  - 5. Selections: Provide samples of two selections for review with the entire mockup panel as follows:
    - a. Brick: Old Virginia Brick Colonial Full Range
    - b. Brick Alternate: Glen-Gery Brick Silverbrook Full Brick

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- B. Hydrated Lime: ASTM C , Type S.
- C. Masonry Cement: ASTM C 91.
  - 1. Available Products:
    - a. Capital Materials Corporation; Flamingo Color Masonry Cement.
    - b. Lehigh Cement Company; Lehigh Masonry Cement.



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- c. National Cement Company, Inc.; Coosa Masonry Cement.
  
- D. Aggregate for Mortar: ASTM C 144.
  1. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
  
- E. Aggregate for Grout: ASTM C 404.
  
- F. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
  1. Available Products:
    - a. Addiment Incorporated; Mortar Kick.
    - b. Euclid Chemical Company (The); Accelguard 80.
    - c. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Morset.
    - d. Sonneborn, Div. of ChemRex; Trimix-NCA.
  
- G. Water: Potable.

## 2.6 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
  
- B. Masonry Joint Reinforcement: ASTM A 951; mill galvanized, carbon-steel wire for interior walls and hot-dip galvanized, carbon-steel wire for exterior walls.
  1. Wire Size for Side Rods: 9 gauge.
  2. Wire Size for Cross Rods: 9 gauge.
  3. Wire Size for Veneer Ties: W1.7 or 0.148-inch diameter.
  4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
  5. Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

## 2.7 TIES AND ANCHORS

- A. Materials:
  1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.
  2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
  3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

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- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
  - 1. Wire: Fabricate from 3/16-inch diameter, hot-dip galvanized steel wire.
- D. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steel wire.
  - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.188-inch diameter, hot-dip galvanized steel wire.
  - 3. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.053-inch thick, steel sheet, galvanized after fabrication.
- E. Partition Top anchors: 0.097-inch thick metal plate with 3/8-inch diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.
- F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins.
  - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

## 2.8 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with Division 07 Section "Sheet Metal Flashing and Trim."
  - 1. Metal Drip Edges: Fabricate from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees.
  - 2. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 3/8 inch to form a stop for retaining sealant backer rod.
  - 3. Metal Expansion-Joint Strips: Fabricate from stainless steel or copper to shapes indicated.
- B. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

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1. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch .

- a. Available Products:

- 1) Advanced Building Products Inc.; Peel-N-Seal.
- 2) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
- 3) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier-44.
- 4) Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Perm-A-Barrier Wall Flashing.
- 5) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
- 6) Hohmann & Barnard, Inc.; Textroflash.
- 7) Polyguard Products, Inc.; Polyguard 300.
- 8) Polytite Manufacturing Corp.; Poly-Barrier Self-Adhering Wall Flashing.
- 9) Williams Products, Inc.; Everlastic MF-40.

- C. Solder and Sealants for Sheet Metal Flashings: As specified in Division 07 Section "Sheet Metal Flashing and Trim."
- D. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.

## 2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products: Use one of the following, unless otherwise indicated:
  1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1 ½ by 3 ½ inches long.
  2. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
  3. Mesh Weep/Vent: Free-draining mesh, made from polyethylene strands, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
1. Available Manufacturers:
    - a. Diedrich Technologies, Inc.
    - b. EaCo Chem, Inc.
    - c. ProSoCo, Inc.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
  2. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
  3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification.
1. For masonry below grade or in contact with earth, use Type M.
  2. For reinforced masonry, use Type S.
  3. For mortar parge coats, use Type S or N.
  4. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
  5. Provide colored mortar for exposed conditions, as selected by architect from manufacturer's full range.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  2. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- B. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- C. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/ 30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- D. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
  - 1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
  - 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.

#### 3.2 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

#### 3.3 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and concrete masonry units as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.

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2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
  3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

3.4 MASONRY JOINT REINFORCEMENT

- A. General: Install in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
- B. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

3.5 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners.
  2. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  3. Space anchors as indicated, but not more than 16 inches o.c. vertically and 32 inches o.c. horizontally with not less than 1 anchor for each 3.5 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.

3.6 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
1. Use specified weep/vent products to form weep holes.
  2. Space weep holes 24 inches o.c., unless otherwise indicated.
  3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.

### 3.7 REINFORCED UNIT MASONRY INSTALLATION

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

### 3.8 CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  - 2. Protect adjacent surfaces from contact with cleaner.
  - 3. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 4. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
  - 5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
  - 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

### 3.9 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.

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2. Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000



SECTION 047000 – MANUFACTURED MASONRY

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Manufactured Stone Veneer.

1.2 RELATED SECTIONS

- A. Section 071416 Waterproofing Systems

1.3 SUBMITTALS

- A. Product Data: Manufactured masonry and application materials including mortar color charts and.
- B. Samples: Panel containing full-size samples of specified manufactured masonry showing full range of colors and textures complete with specified pointing mortar.
  - 1. Actual size of masonry sample approximately 12 inches x 12 inches.
  - 2. Colored Pointing Mortar Samples: For each color required from manufacturer's full range.
- C. Quality Assurance / Control Submittals
  - 1. Qualifications
    - a. Proof of manufacturer qualifications.
    - b. Proof of installer qualifications.
  - 2. Certificates: ICC\_ES Report
  - 3. Test Reports for physical properties.
  - 4. Manufacturer's Installation Instructions

1.4 QUALITY ASSURANCE

- A. Qualifications:
  - 1. Manufacturer Qualifications:
    - a. Minimum five years experience in producing manufactured masonry.
    - b. Member of the following organizations:
      - 1) MSJC
      - 2) ACI
      - 3) ASTM

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2. Installer Qualifications: Company with documented experience in installation of manufactured masonry including minimum five projects.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockups of typical exterior wall area not less than 48 inches long by 48 inches high.

1.5 FIELD CONDITIONS

- A. Environmental Requirements: Maintain materials and ambient temperature in area of installation at minimum 40 degrees F prior to, during and for 48 hours following installation.
- B. Hot-Weather Requirements: Comply with hot-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
- C. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below 40 deg F or when joint substrates are wet.

1.6 WARRANTY

- A. Warranty: Provide manufacturer's standard limited warranty against defects in manufacturing for a period of 50 years following date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 MANUFACTURED STONE

- A. Products: Subject to compliance with requirements, provide the following manufactured stone products:
1. Boral Cultured Stone Ancient Villa Ledgestone Siena
- B. Manufactured Masonry Physical Properties
1. Compressive Strength: ASTM C 192 and ASTM C 39, 1800 psi.
  2. Bond between Stone Unit, Mortar and Backing: ASTM C 482, 50 psi.
  3. Thermal Resistance: ASTM C 177, R-factor, 0.355 per inch of thickness.

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4. Freeze/Thaw: ASTM C 67, 50 cycles, no disintegration and less than 3 percent weight loss.
5. Fire Hazard Test UL 723
  - a. Flame Spread: 0.
  - b. Smoke Development: 0
6. Maximum Veneer Unit Weight: 15 psf.

2.3 RELATED MATERIALS

- A. Waterproofing (at Clubhouse exterior and Storage Shed Only): See Section 071416 Waterproofing Systems.

2.4 MORTAR:

- A. Dry-set, thin-set mortar and polymer additive. Flexible polymer-modified Portland cement mortar, complying with ANSI A118.4 and ISO 13007 C2ES2P2.
  1. Mapei Kerabond/Keralastic System consisting of factory prepared dry-set mortar with Mapei latex additive.
- B. Pointing Mortar:
  1. Premixed Type N, Type S or mortar mixed using components and proportions following manufactured masonry manufacturer's installation instructions. Comply with ASTM C 270
    - a. Mortar Color: Iron oxide pigments.

PART 3 - PRODUCTS

3.1 EXAMINATION

- A. Examine substrates upon which manufactured masonry will be installed.
- B. Coordinate with responsible entity to correct unsatisfactory conditions.
- C. Commencement of work by installer is acceptance of substrate conditions.

3.2 PREPARATION

- A. Protection: Prevent work from occurring on the opposite of walls to which manufactured masonry is applied during and for 48 hours following installation of the manufactured masonry.
- B. Surface Preparation: Follow manufacturer's instruction designated below for the appropriate type of manufactured masonry and substrate.

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3.3 INSTALLATION

- A. Install cultured stone products in accordance with manufacturer's cultured stone installation instructions using grouted joints.

3.4 CLEANING

- A. Clean manufactured masonry in accordance with manufacturer's installation instructions

3.5 PROTECTION

- A. Protect finished work from rain during and for 48 hours following installation.
- B. Protect finished work from damage during remainder of construction period.

END OF SECTION 044200

## **SECTION 047200 - CAST STONE MASONRY**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Cast stone trim, brackets, ledges.
  - 2. Cast stone columns.

#### 1.2 RELATED SECTIONS

- A. Section 079200 Joint Sealants

#### 1.3 SUBMITTALS

- A. Product Data: Include dimensions of individual components.
- B. Shop Drawings: Show fabrication and installation details for cast stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.
- C. Samples: For each color and texture of cast stone required.
- D. Qualification Data: For manufacturer.
- E. Material Test Reports.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast stone units similar to those indicated for this Project, with sufficient production capacity to manufacture required units.
- B. Mockup: Provide minimum 12"x24" panel to verify selections made and to demonstrate aesthetic effects of texture and color.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

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

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1. St. Augustine Cast Stone

## 2.2 CAST STONE UNITS

- A. Provide cast stone units complying with ASTM C 1364.
  1. Provide units that are resistant to freezing and thawing.
  2. Slope exposed horizontal surfaces 1:12, unless otherwise indicated.
  3. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
  4. Provide drips on projecting elements, unless otherwise indicated.
- B. Cure units by one of the following methods:
  1. Cure units with steam in enclosed curing room at temperature of 105 deg F or above and 95 to 100 percent relative humidity for 6 hours.
  2. Cure units with dense fog and water spray in enclosed warm curing room at 95 to 100 percent relative humidity for 24 hours.
  3. Cure units to comply with one of the following:
    - a. Not less than 5 days at mean daily temperature of 70 deg F or above.
    - b. Not less than 6 days at mean daily temperature of 60 deg F or above.
    - c. Not less than 7 days at mean daily temperature of 50 deg F or above.
    - d. Not less than 8 days at mean daily temperature of 45 deg F or above.
- C. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- D. Colors and Textures: St. Augustine Cast Stone Cut Coral "Dark Buff" or matched as selected by Architect from manufacturer's full range.
- E. Compressive Strength: minimum 5,000 psi.

## 2.3 ACCESSORIES

- A. Anchors and Dowels: Type 304 stainless steel.
- B. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner complying with requirements in Division 04 Section "Unit Masonry" and approved for intended use by cast stone manufacturer and approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

## 2.4 MORTAR

- A. Comply with requirements in Division 04 Section "Unit Masonry" for mortar materials and mixes.
  1. For setting mortar, use Type **N**.
  2. Limit cementitious materials to Portland cement and lime.

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2.5 Sealant

- A. Comply with requirements in Division 7 Section Joint Sealants, recommended by sealant manufacturer and manufacturer of substrates for intended application.

2.6 SOURCE QUALITY CONTROL

- A. Employ an independent testing agency to sample and test cast stone units according to ASTM C 1364.

**PART 3 - EXECUTION**

3.1 SETTING CAST STONE IN MORTAR

- A. Install cast stone units to comply with requirements in Division 04 Section "Unit Masonry."
- B. Set units in full bed of mortar with full head joints, unless otherwise indicated.
  - 1. Fill dowel holes and anchor slots with mortar.
  - 2. Fill collar joints solid as units are set.
  - 3. Keep joints in all units with open to receive sealant.
- C. Rake out joints for sealant application to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- D. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated. Keep joints free of mortar and other rigid materials.
- E. Prepare joints indicated to receive sealant and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.2 SETTING ANCHORED CAST STONE WITH SEALANT-FILLED JOINTS

- A. Set cast stone units accurately in locations indicated with edges and faces aligned.
  - 1. Install anchors, supports, fasteners, and other attachments to secure units in place.
  - 2. Shim and adjust anchors, supports, and accessories.
- B. Fill anchor holes with sealant. Where dowel holes occur at pressure-relieving joints, provide compressible material at ends of dowels.
- C. Set cast stone supported on clip or continuous angles on resilient setting shims. Hold shims back from face of cast stone a distance at least equal to width of joint.

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- D. Keep joints free of mortar and other rigid materials. Remove temporary spacers from joints after anchors and supports are secured in place and cast stone units are anchored.
- E. Prepare joints and apply sealant of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet , or 3/8 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 36 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except due to warpage of units.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
  - 1. Replace units in a manner that shows no evidence of replacement.
- B. In-Progress Cleaning: Clean cast stone as work progresses.
  - 1. Remove mortar fins and smears before tooling joints.
  - 2. Remove excess sealant immediately, including spills, smears, and spatter.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone to comply with requirements in Division 04 Section "Unit Masonry."

END OF SECTION 047200



## **SECTION 055000 - METAL FABRICATIONS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. As indicated on drawings.

#### 1.2 SUBMITTALS

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

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

#### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.
- B. Ferrous Metals:
  - 1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Nonferrous Metals:
  - 1. Aluminum Extrusions: ASTM B 221, alloy 6063-T6.

#### 2.3 FASTENERS

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

#### 2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI #79.
- B. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

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- C. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- E. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi, unless otherwise indicated.

## 2.5 FABRICATION

- A. General: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
  - 1. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
  - 2. Weld corners and seams continuously. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals. Obtain fusion without undercut or overlap. Remove welding flux immediately. Finish exposed welds smooth and blended.
  - 3. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
  - 4. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
  - 5. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 24 inches o.c.
- B. Miscellaneous Framing and Supports: Provide steel framing and supports not specified in other Sections as needed to complete the Work. Fabricate units from steel shapes, plates, and bars of welded construction. Cut, drill, and tap units to receive hardware, hangers, and similar items.

## 2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Finish metal fabrications after assembly.
- B. Steel and Iron Finishes:
  - 1. Hot-dip galvanize items as indicated to comply with ASTM A 123/A 123M or ASTM A 153/A 153M as applicable.
  - 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with requirements indicated below for environmental exposure conditions of installed metal fabrications:

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- a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting," for shop painting.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. General: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, with edges and surfaces level, plumb, and true.
  1. Fit exposed connections accurately together. Weld connections that are not to be left as exposed joints but cannot be shop welded. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication.
  2. Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.
  3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- B. Set bearing and leveling plates on cleaned surfaces using wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts and pack solidly with nonshrink, nonmetallic grout.
- C. Touch up surfaces and finishes after erection.
  1. Painted Surfaces: Clean field welds, bolted connections, and abraded areas and touch up paint with the same material as used for shop painting.
  2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000

## **SECTION 057300 - DECORATIVE METAL RAILINGS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Aluminum ornamental railings.

#### **1.2 PERFORMANCE REQUIREMENTS**

A. Structural Performance: Provide railings capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Handrails:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. applied in any direction.
- b. Concentrated load of 200 lbf applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

3. Infill of Guards:

- a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
- b. Uniform load of 25 lbf/sq. ft. (1.2 kN/sq. m) applied horizontally.
- c. Infill load and other loads need not be assumed to act concurrently.

B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

#### **1.3 SUBMITTALS**

A. Product Data: For railings assembled from standard components, grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.

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1. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Samples: For each exposed finish required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

1.4 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  1. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  1. Aluminum Ornamental Railings:
    - a. Architectural Metal Works.
    - b. Metal Crafts of South Florida (561-882-4026)

2.2 METALS

- A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails, unless otherwise indicated.
- B. Aluminum: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
  1. Extruded Bars and Shapes: ASTM B 221, Alloy 6063-T5/T52.
  2. Extruded Structural Tubing: ASTM B 429, Alloy 6063-T6.
  3. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

## 2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide concealed fasteners, unless exposed fasteners are unavoidable.
  - 1. Aluminum Components: Type 316 stainless-steel fasteners.
  - 2. Dissimilar Metals: Type 316 stainless-steel fasteners.
- B. Anchors: Provide torque-controlled expansion anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488.
- C. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- D. Grout and Anchoring Cement: Factory-packaged, nonshrink, nonmetallic grout complying with ASTM C 1107, or water-resistant, nonshrink, anchoring cement; recommended by manufacturer for exterior use.

## 2.4 FABRICATION

- A. General: Fabricate railings to comply with design, dimensions, and details indicated, but not less than that required to support structural loads.
- B. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
- C. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
- D. Form changes in direction by bending or by inserting prefabricated elbow fittings.
- E. Form curves by bending in jigs to produce uniform curvature; maintain cross section of member throughout bend without cracking or otherwise deforming exposed surfaces.
- F. Close exposed ends of hollow railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work, unless otherwise indicated.

## 2.5 FINISHES

- A. Aluminum:
  - 1. Class I, Clear Anodic Finish: AA-M12C22A41 complying with AAMA 611.
  - 2. Class I, Color Anodic Finish: AA-M12C22A42/A44 complying with AAMA 611.
    - a. Color: Black Powder Coat

- b. Color alternate: Bronze.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. General: Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation.
  - 1. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 2. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. 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.
- C. Anchor posts in concrete by inserting into formed or core-drilled holes and grouting annular space.
- D. Anchor posts to metal surfaces as indicated using fittings designed and engineered for this purpose.
- E. Attach handrails to wall with wall brackets.
- F. Touchup Painting: Immediately after erection, clean abraded areas and paint exposed areas with same material as used for shop painting.

END OF SECTION 057300

## **SECTION 061000 - ROUGH CARPENTRY**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Framing with dimension lumber.
  - 2. Wood blocking and nailers.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. 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 American Lumber Standards Committee Board of Review.

### **PART 2 - PRODUCTS**

#### 2.1 WOOD PRODUCTS, GENERAL

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

#### 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: Treatment process shall be per the American Wood Protection Association Standard for each type of application and condition.
  - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.



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- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry, unless otherwise indicated.

2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 19 percent.
- B. Other Framing: Construction, Stud, or No. 2 grade and any of the following species:
  - 1. Southern pine; SPIB.
  - 2. Mixed southern pine; SPIB.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content of any species.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and the following species and grades:
  - 1. Mixed southern pine, No. 2 grade; SPIB.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

2.6 METAL FRAMING ANCHORS

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

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1. Alpine Engineered Products, Inc.
  2. Cleveland Steel Specialty Co.
  3. Harlen Metal Products, Inc.
  4. KC Metals Products, Inc.
  5. Simpson Strong-Tie Co., Inc.
  6. Southeastern Metals Manufacturing Co., Inc.
  7. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

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.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- D. Do not splice structural members between supports, unless otherwise indicated.
- E. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- F. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

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1. NES NER-272 for power-driven fasteners.
2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

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.

END OF SECTION 061000

## **SECTION 061600 - SHEATHING**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

A. This Section includes the following:

1. Wall sheathing.
2. Roof sheathing.
3. Building wrap.

#### 1.2 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.

#### 1.3 QUALITY ASSURANCE

#### 1.4 DELIVERY, STORAGE, AND HANDLING

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

### **PART 2 - PRODUCTS**

#### 2.1 WOOD PANEL PRODUCTS, GENERAL

A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.

#### 2.2 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA C9.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Treat all plywood, unless otherwise indicated Drawings.

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2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior and as noted on the structural drawings.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior and as noted on the structural drawings.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated.
  - 1. For wall and roof sheathing panels, provide fasteners with corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

2.6 WEATHER-RESISTANT SHEATHING PAPER

- A. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
    - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
  - 2. Water-Vapor Permeance: Not less than 535 g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).
- B. Building-Wrap Tape: Tape recommended by building-wrap manufacturer.
- C. Water Resistive Barrier: No. 15 asphalt felt, complying with ASTM D 226 for Type 1 felt at stucco on lath locations.

2.7 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive, rubberized-asphalt compound, bonded to a high-density, polyethylene film to produce an overall thickness of not less than 0.025 inch.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION, GENERAL**

- A. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
  - 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's "Uniform Building Code."
  - 4. Table 2305.2, "Fastening Schedule," in BOCA's "BOCA National Building Code."
  - 5. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."
  - 6. 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."
  - 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."
- B. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that exclude exterior moisture.
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

#### **3.2 WOOD STRUCTURAL PANEL INSTALLATION**

- A. General: Comply with applicable recommendations in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial."
  - 1. Comply with "Code Plus" installation provisions in guide referenced in paragraph above.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Screw to cold-formed metal framing.
- C. Building Wrap: Comply with manufacturer's written instructions.
  - 1. Seal seams, edges, fasteners, and penetrations with tape.
  - 2. Extend into jambs of openings and seal corners with tape.

#### **3.3 SHEATHING JOINT-AND-PENETRATION TREATMENT**

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.

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1. Apply elastomeric sealant to joints and fasteners and trowel flat. Seal other penetrations and openings.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.

1. Lap seams and junctures with other materials at least 4 inches , except that at flashing flanges of other construction, laps need not exceed flange width.
2. Lap flashing over weather-resistant building paper at bottom and sides of openings.
3. Lap weather-resistant building paper over flashing at heads of openings.
4. After flashing has been applied, roll surfaces with a hard rubber or metal roller.

END OF SECTION 061600

## **SECTION 061753 - SHOP-FABRICATED WOOD TRUSSES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Wood roof trusses.
  - 2. Wood girder trusses.

#### **1.2 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.

#### **1.3 SUBMITTALS**

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.
- B. Shop Drawings: Show fabrication and installation details for trusses.
  - 1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
  - 2. Indicate sizes, stress grades, and species of lumber.
  - 3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
  - 4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
  - 5. Show splice details and bearing details.
  - 6. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### **1.4 QUALITY ASSURANCE**

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
  - 1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.



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- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- C. Comply with applicable requirements and recommendations of the following publications:
  - 1. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
  - 2. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
  - 3. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and it's "Supplement."
- E. Forest Certification: Provide metal-plate-connected wood trusses 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."

**PART 2 - PRODUCTS**

2.1 DIMENSION LUMBER

- A. Lumber: DOC PS 20. Provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and it's "Supplement."
- C. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section Rough Carpentry.

2.2 METAL PRODUCTS

- A. Connector Plates: Fabricate connector plates to comply with TPI 1 from hot-dip galvanized steel sheet complying with ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 coating designation; and not less than 0.036 inch thick.

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- B. Fasteners: Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
  - 1. Nails, Brads, and Staples: ASTM F 1667.
  - 2. Power-Driven Fasteners: NES NER-272.
  - 3. Wood Screws: ASME B18.6.1.
  - 4. Lag Bolts: ASME B18.2.1.
  - 5. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
  
- C. Metal Truss Accessories: Provide truss accessories made from hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 3. Basis-of-Design Products: Subject to compliance with requirements, provide comparable products by one of the following:
    - a. Simpson Strong-Tie Co., Inc.
    - b. Southeastern Metals Manufacturing Co., Inc.
    - c. USP Structural Connectors.
  - 4. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those of basis-of-design products. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.3 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
  
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

### **PART 3 - EXECUTION**

#### 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.
- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Division 06 Section Rough Carpentry.
  - 2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not cut or remove truss members.
- J. Replace wood trusses that are damaged or do not meet requirements.
- K. Where ceiling component placement is critical according to the drawings, install trusses spaced as indicated on the architectural sheet A3.1.

END OF SECTION 061753

## **SECTION 064013 - EXTERIOR ARCHITECTURAL WOODWORK**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Exterior standing and running trim.
  - 2. Exterior frames and jambs.
  - 3. Exterior ornamental work.
  - 4. Shop priming exterior woodwork.
  - 5. Shop finishing exterior woodwork.

#### 1.2 SUBMITTALS

- A. Product Data: For wood-preserved-treated materials and finishes indicated.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples: For lumber for exterior wood stain finish and lumber and panel products for shop-applied opaque finish, for each finish system and color, with one-half of exposed surface finished.
- D. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

#### 1.3 QUALITY ASSURANCE

- A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. Exterior Running Trim: No.1 pressure treated pine.
- B. Exterior Exposed Beams, Columns, False rafters: No.1 pressure treated pine S4S.
- C. Wood preservative Treated Materials, by pressure process: AWPA C2

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- D. Plywood Siding: APA rated exterior siding with MDO smooth face, thickness as indicated.
  - 1. Grooves at 4" o.c. on exposed side – soffits.
- E. Nails: Aluminum, hot-dip galvanized or stainless steel.
- F. Screws: Aluminum, hot-dip galvanized or stainless steel.

2.2 FABRICATION

- A. Wood Moisture Content: 9 to 15 percent.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- C. Woodwork for Transparent Finish:
  - 1. Grade: Premium.
  - 2. Wood Species: No.1 pressure treated pine, S4S.
- D. Woodwork for Opaque Finish:
  - 1. Grade: Premium.
  - 2. Wood Species: No.1 pressure treated pine, S4S.
- E. 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.
- F. Shop Priming: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- G. Shop Finishing: Entire finish of exterior architectural woodwork is specified in this Section. To greatest extent possible, finish architectural woodwork at fabrication shop. Defer only final touchup and cleaning until after installation.
  - 1. Grade: Same grade as item to be finished.
  - 2. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.
- C. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- F. Install trim with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members.
- G. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.
- H. Refer to Division 09 Sections for final finishing of installed architectural woodwork.
- I. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064013

## **SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Interior standing and running trim.
2. Interior frames and jambs.
3. Flush wood paneling and wainscots.
4. Wood cabinets.
5. Plastic-laminate cabinets.
6. Solid-surfacing-material countertops.
7. Shop finishing of woodwork.

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

#### **1.2 SUBMITTALS**

A. Product Data: For solid-surfacing material, cabinet hardware/accessories and finishing materials and processes.

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

C. Samples:

1. Lumber and panel products 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.
3. Plastic-laminates, for each type, color, pattern, and surface finish.
4. Thermoset decorative panels, for each type, color, pattern, and surface finish.
5. Solid-surfacing materials.

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

#### **1.3 QUALITY ASSURANCE**

A. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards."

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1.4 PROJECT CONDITIONS

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

**PART 2 - PRODUCTS**

2.1 WOODWORK FABRICATORS

- A. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

- A. Wood Species and Cut for Transparent Finish: Maple.
- B. Wood Species for Opaque Finish: Poplar.
- C. Wood Products:
  - 1. Hardboard: AHA A135.4.
  - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
  - 3. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
  - 4. Softwood Plywood: DOC PS 1, Medium Density Overlay.
  - 5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
- D. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
- F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Formica Corporation.
    - b. Wilsonart International; Div. of Premark International, Inc.



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2.3 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural woodwork, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch thick metal, and as follows:
  - 1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
  - 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening.
- D. Back-Mounted Pulls: BHMA A156.9, B02011.
- E. Pulls: As indicated or selected by interior designer.
- F. Catches: Magnetic catches, BHMA A156.9, B03141, Stanley No.SP46.
- G. Drawer Slides: BHMA A156.9, B05091.
  - 1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
  - 2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
  - 3. Box Drawer Slides: Grade 1; for drawers not more than 6 inches high and 24 inches wide.
  - 4. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches high or 24 inches wide.
  - 5. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches high and 24 inches wide.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
  - 2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
  - 3. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
  - 4. Satin Stainless Steel: BHMA 630.

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2.4 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

2.5 FABRICATION

- A. General: Complete fabrication to maximum extent possible before shipment to Project site. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.

1. Interior Woodwork Grade: Premium.
2. Shop cut openings to maximum extent possible. Sand edges of cutouts to remove splinters and burrs. Seal edges of openings in countertops with a coat of varnish.

- B. Interior Standing and Running Trim:

1. For transparent-finished trim items wider than available lumber, use veneered construction. Do not glue for width.
2. 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.
3. Assemble casings in plant except where limitations of access to place of installation require field assembly.

- C. Flush Wood Paneling and Wainscots:

1. Lumber Trim and Edges: At fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction compatible with grain and color of veneered panels.
2. Matching of Adjacent Veneer Leaves: Book match.
3. Veneer Matching within Panel Face: Running match.
4. Panel-Matching Method: No matching between panels is required. Select and arrange panels for similarity of grain pattern and color between adjacent panels.
5. Panel-Matching Method: In each separate area, use pre-manufactured sets selectively reduced in width.

- D. Plastic-Laminate Cabinets:

1. AWI Type of Cabinet Construction: As indicated.
2. Reveal Dimension: As indicated.
3. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate as follows:
  - a. Horizontal Surfaces Other Than Tops: Grade HGS.
  - b. Postformed Surfaces: Grade HGP.
  - c. Vertical Surfaces: Grade HGS.
  - d. Edges: Grade HGS.
4. Materials for Semiexposed Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.

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5. Drawer Sides and Backs: Solid-hardwood lumber.
6. Drawer Bottoms: Hardwood plywood.
7. Colors, Patterns, and Finishes: As indicated on Interior Designers drawings.
8. Colors, Patterns, and Finishes: As selected by Interior Designer.
9. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

E. Solid-Surfacing-Material Countertops:

1. Solid-Surfacing-Material Thickness: As indicated but no less than ½”.
2. Colors, Patterns, and Finishes: As indicated on Interior Designers drawings.
3. Fabricate tops in one piece with shop-applied backsplashes. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
4. Where indicated, install integral sink bowls in countertops in shop.

2.6 SHOP FINISHING

- A. Finish architectural woodwork at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling.
- C. Transparent Finish:
1. Grade: Premium.
  2. AWI Finish System: Acrylic lacquer.
  3. WI Finish System: 2, water-reducible acrylic lacquers.
  4. Staining: As indicated on Interior Designers drawings.
  5. Wash Coat for Stained Finish: Apply a wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
  6. Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
  7. Sheen: Flat 15-30, Satin 31-45, Semigloss 46-60 and Gloss 61-100 gloss units measured on 60-degree gloss meter per ASTM D 523.
- D. Opaque Finish:
1. Grade: Premium.
  2. AWI Finish System: Conversion varnish.
  3. WI Finish System: 3b. catalyzed vinyl lacquer.
  4. Color: As indicated on Interior Designers drawings.
  5. Sheen: Flat 15-30, Satin 31-45, Semigloss 46-60 and Gloss, 61-100 gloss units measured on 60-degree gloss meter per ASTM D 523.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas. Examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.
- B. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- C. Install woodwork level, plumb, true, and straight to a tolerance of 1/8 inch in 96 inches. Shim as required with concealed shims.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Scarf running joints and stagger in adjacent and related members. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
- G. Paneling: Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening, unless covered by trim.
- H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation.
  - 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
- I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."

END OF SECTION 064023

## **SECTION 071416 – WATERPROOFING SYSTEMS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

A. Section Includes:

1. Waterproofing Systems for use at site walls, lake edge walls, behind stone veneer, behind porcelain wall tile and other locations indicate or required on the Drawings.

#### 1.2 RELATED SECTIONS

- A. 047000 Manufactured Masonry
- B. 093000 Tiling

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is acceptable to waterproofing manufacturers for installation of waterproofing required for this Project.
- B. Pre-installation conference: Conduct pre-installation conference on site with manufacturer representative for each product and Architect prior to work.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

## **PART 2 - PRODUCTS**

2.1 Waterproofing System 1 – At site masonry walls, unless indicated otherwise.

- A. Bituminous Sealer – black color.
  - 1. Tremco Tremproof 250GC
  - 1. Tremco protection mat

2.2 Waterproofing System 2 – at lake edge retaining walls.

- A. Waterproof cement-based coating for concrete and masonry
  - 1. Two coat BASF Thoroseal polymer modified with BASF Acryl 60.
  - 2. Apply per manufacturer recommendation.
  - 3. Provide 14 oz. polyester protection mat.

2.3 Waterproofing System 3 – behind manufactured stone veneer and behind porcelain wall tile at Clubhouse Building and Storage Shed only.

- B. Premium Latex Based Waterproofing and Crack Isolation Membrane
  - 1. Mapei Mapelastic AquaDefense
  - 2. Apply per manufacturer recommendation.

## **PART 3 - EXECUTION**

3.1 SURFACE PREPARATION

- A. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to and manufacturer's written instructions.

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3.2 WATERPROOFING APPLICATION

- A. Apply all waterproofing in strict accordance with manufacturer recommendations and instructions.

3.3 CURING, PROTECTION, AND CLEANING

- A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071416

## **SECTION 072100 - THERMAL INSULATION**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

A. This Section includes the following:

1. Glass fiber batt insulation – for interior partitions - sound attenuation insulation.
2. Foam-plastic board insulation.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product test reports.
- C. Research/Evaluation Reports:

#### 1.3 QUALITY ASSURANCE

- A. Retain ASTM test method below based on product and kind of fire-resistance characteristic specified for each product in Part 2. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

### **PART 2 - PRODUCTS**

#### 2.1 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standard sand, for preformed units, in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths and lengths.
- B. Glass Fiber Batt Insulation: unfaced glass fiber acoustical insulation complying with ASTM C 665, Type 1.



- C. Foam Plastic Board Insulation
  - 1. Extruded-Polystyrene Board Insulation: ASTM C 578, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
    - a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Dow Chemical Company
    - b. R Value: R-11

## 2.2 AUXILIARY INSULATING MATERIALS

- A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

## 2.3 INSULATION FASTENERS

- A. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

## **PART 3 - EXECUTION**

### 3.1 INSTALLATION

- A. General: Install insulation to comply with insulation manufacturer's written instructions applicable to products and application indicated. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- B. Installation of General Building Insulation: Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
  - 1. Seal joints between closed-cell (nonbreathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
  - 2. Install glass-fiber blankets in cavities formed by framing members according to the following requirements:
    - a. Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.

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- b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  
3. Foam plastic board insulation – Apply insulation units to substrates by method indicated, complying with manufacturer’s written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units. Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved in to place. Fill voids in completed installation with adhesive, mastic , or sealant as recommended by insulation manufacturer.

END OF SECTION 072100

## **SECTION 072129 - SPRAYED INSULATION**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes: Light density, open celled, flexible, 100 percent water blown polyurethane foam insulation.
- B. Coordinate mechanical ventilation and fresh air supply with Mechanical sections and ASHRAE Guidelines for optimum indoor air quality.

#### **1.2 REFERENCES**

- A. American Society for Testing and Materials International (ASTM)
  - 1. ASTM C 518: Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
  - 2. ASTM D 2863: Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
  - 3. ASTM E 84: Test Method for Surface Burning Characteristics of Building Materials
  - 4. ASTM E 96: Standard Test Methods for Water Vapor Transmission of Materials
  - 5. ASTM E 2178: Standard Test Method for Air Permeance of Building Materials
  - 6. ASTM E 283: Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

#### **1.3 SUBMITTALS**

- A. Product Data for each type of insulation product specified.
- B. Product test reports performed by a qualified independent testing agency evidencing compliance of insulation products with specified requirements including those for thermal resistance, fire-test-response characteristics, water-vapor transmission, water absorption, and other properties, based on comprehensive testing of current products.
- C. Evaluation Report: Evidence of compliance of foam-plastic insulations with International Building Code (IBC), International Residential Code (IRC), International Energy Conservation Code (IECC), International Association of Plumbing and Mechanical Officials (IAPMO)
- D. Manufacturer's certificate certifying insulation provided meets or exceeds specified requirements.
- E. Installer's certificate showing the Icynene installation certification.
- F. Sample warranty

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: Product produced in an ISO9001 registered factory.

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- B. Single Source Responsibility: Single source product from one manufacturer.
  - C. Installer Qualifications: Engage an Icynene Licensed Dealer (applicator) who has been trained and certified by Icynene.
  - D. Fire-Test-Response Characteristics: Provide materials specified as determined by testing identical products per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
    - 1. Surface-Burning Characteristics: ASTM E 84
  - E. Toxicity/Hazardous Materials
    - 1. Provide products that contain no urea-formaldehyde
    - 2. Products and equipment requiring or using CFCs, HCFCs, or HFCs during the manufacturing or application process will not be permitted
    - 3. Provide products that contain no PBDEs
    - 4. Provide products that are "Low-emitting"
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Comply with manufacturers written instructions for handling and protection prior to and during installation.
  - B. Store both components in a temperature controlled area between 50 deg F (15 deg C) and 100 deg F (32 deg C). Do not allow product to freeze.
  - C. Use only those components that are supplied by the Manufacturer.
- 1.6 PROJECT CONDITIONS
- A. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
- 1.7 WARRANTY
- A. Manufacturer's standard limited lifetime warranty.
  - B. Refer to [www.Icynene.com](http://www.Icynene.com) for full warranty terms.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Polyurethane Spray Foam Insulation: ICYNENE LD-C-50™ by Icynene Inc. – No Substitutions.

2.2 MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
- B. ICYNENE LD-C-50™ Spray Foam Insulation: Low-density, water-blown, conforming to the following:
  - 1. Thermal Resistance (R-Value/inch @75 deg F): ASTM C 518; 3.7 hr/sq ft/degree F/BTU

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- a. Heat Flow Reduction:
    - 1) Through 1 inch: 75 percent
    - 2) Through 3.5 inches 93 percent
    - 3) Through 5.5 inches 95 percent
    - 4) Through 10.5 inches 98 percent
  2. Air Permeance (for 2 inches of material): ASTM E 283; <0.02 L/S.m<sup>2</sup> @75 Pa
  3. Air Permeance (for 5.5 inches of material): ASTM E 2178; < 0.02 L/s.m<sup>2</sup> @ 75 Pa
  4. Water Vapor Transmission (for 5.5 inches of material): ASTM E 96; 11 perms [627 ng/(Pa.s.m<sup>2</sup>)]
  5. Flame Spread and Smoke Developed Rating: ASTM E 84
    - a. Flame Spread: Less than 20
    - b. Smoke Development: Less than 400
    - c. Oxygen Index 23 percent
  6. Bacterial and Fungal Growth and Food Value: Texas Tech. University; not a source of food for mold (no growth)
  7. DC 315 Intumescent coating – in thickness as required to perform as an ignition barrier. See ICC/ES Evaluation Report No. ESR 1826.
- C. Product Description:
1. ICC/ES Evaluation Report No. ESR 1826
  2. IAPMO-ES Report No. 0165

## 2.3 SOURCE QUALITY CONTROL

- A. Product produced in an ISO 9001 registered factory.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected.
  1. Review placement area to determine final location will not be within 3 inches of any heat source where the temperature will exceed 200 deg F per ASTM C 411 or in accordance with authorities having jurisdiction.

### 3.2 PREPARATION

- A. Clean substrates and cavities of loose materials capable of interfering with insulation placement.

### 3.3 APPLICATION

- A. Site mix liquid components manufactured by Icynene and supplied by Independent Icynene Licensed Dealer.
- B. Apply insulation to substrates in compliance with manufacturer's written instructions.
- C. Apply insulation to produce thickness required for indicated R Value.

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1. R-22.2

- D. Extend insulation in thickness indicated to envelop entire area to be insulated.
- E. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
- F. DC 315 intumescent coating to be applied at a minimum wet film thickness as required to perform as an ignition barrier. Surfaces to be coated must be dry, clean, and free of dirt, loose debris and other substances that could interfere with adhesion of the coating. The coating is applied in one coat with low-pressure airless spray equipment. The coating must be applied when ambient and substrate temperature is at least 60d F and no more than 95d F. All other surfaces must be protected against damage from the coating.

3.4 REPAIRS

- A. Any repairs must be affected by an Icynene Licensed Dealer.

3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse.
  - 1.

END OF SECTION 072129

## **SECTION 072413 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Exterior finish system applied over stucco.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Class PB EIFS: Physical properties and structural performance that comply with ICC-ES AC219.

#### 1.3 SUBMITTALS

- A. Product Data: For each type and component of EIFS indicated.
- B. Shop Drawings: For EIFS. Include plans, elevations, sections, details, penetrations, terminations, joints, fasteners, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.
- D. Material certificates.
- E. Product test reports.
- F. Field quality-control reports.
- G. Evaluation reports.
- H. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's acrylic finish system using trained workers.
- B. Fire-Test-Response Characteristics: Provide system components with the following fire-test-response characteristics as determined by testing identical system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.

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1. Fire-Resistance Characteristics: Per ASTM E 119.
  2. Radiant Heat Exposure: No ignition of EIFS per NFPA 268.
  3. Potential Heat: Acceptable level per NFPA 259.
  4. Surface-Burning Characteristics: finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.
- C. Mockups: Build mockups (5'x10' panel minimum) to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution and set quality standards for fabrication and installation. Provide two integrally colored mockup panels to match the two stucco color options listed in the drawings.

## **PART 2 - PRODUCTS**

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Acrocrete, Inc.
  2. Corev America, Inc.
  3. Dryvit Systems, Inc.
  4. El Rey Stucco Company, Inc.; a brand of ParexLahabra, Inc.
  5. Finestone; Degussa Wall Systems, Inc.
  6. Master Wall, Inc.
  7. Omega Products International, Inc.
  8. Parex, Inc.; a brand of ParexLahabra, Inc.
  9. Pleko LLC.
  10. Senergy; Degussa Wall Systems, Inc.
  11. SonoWall; Degussa Wall Systems, Inc.
  12. Sto Corp.
  13. Stuc-O-Flex International, Inc.
  14. TEC; an H. B. Fuller company.
  15. Total Wall Inc.

### 2.2 MATERIALS

- A. Compatibility: Provide finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
- B. Finish-Coat Materials: Factory-mixed, standard acrylic-based coating.
1. Colors: As indicated on the construction documents, match specified Benjamin Moore colors.
  2. Textures: As selected by Architect from manufacturer's full range.



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- C. Mechanical Fasteners: Corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener suitable for substrate.
- D. Trim Accessories: manufactured from UV-stabilized PVC and complying with ASTM D 1784 and ASTM C 1063.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of finish coat as applicable to each type of substrate indicated.
- B. Finish Coat: Apply over conventional stucco, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
  - 1. Texture: As selected by Architect from manufacturer's full range.

3.2 FIELD QUALITY CONTROL

- A. EIFS Tests and Inspections: For the following:
  - 1. According to ICC-ES AC24.
- B. Prepare test and inspection reports.

END OF SECTION 072413

## SECTION 072500 - WEATHER BARRIERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Building paper.
2. Building wrap.
3. Flexible flashing.

#### 1.2 ACTION SUBMITTALS

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

#### 1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier, from ICC-ES.

### PART 2 - PRODUCTS

#### 2.1 WATER-RESISTIVE BARRIER

- A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
- B. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
    - b. DuPont (E. I. du Pont de Nemours and Company); Tyvek StuccoWrap.
  2. Water-Vapor Permeance: Not less than 50 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
- C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

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2.2 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Self-adhesive **butyl rubber or rubberized-asphalt** compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover sheathing with water-resistive barrier as follows:
1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
  2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.
- B. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.
- C. Building Wrap: Comply with manufacturer's written instructions.
1. Seal seams, edges, fasteners, and penetrations with tape.
  2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
1. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
  2. Lap flashing over water-resistive barrier at bottom and sides of openings.
  3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION 072500

## **SECTION 073216 - CONCRETE ROOF TILES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Concrete roof tiles.
2. Tile accessories.
3. Self-adhering sheet underlayment.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of concrete tile, concrete tile accessory, and fastening.
- C. Research/evaluation reports.
- D. Maintenance data.

#### **1.3 QUALITY ASSURANCE**

- A. Fire-Test-Response Characteristics: Provide concrete tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire-Test Exposure: Class A to ASTM E 108 for application and roof slopes indicated.
- B. Installer experience: minimum four years of documented experience with concrete tile and approved by the tile manufacturer.
- C. The roofing subcontractor shall obtain, maintain on the job site, and comply with the FRSA Roof Tile Institute Concrete and Clay Roof Tile Installation Manual System No. 4 System Option "B".
- D. Mockups: Build roof mockups to verify selections made and to demonstrate aesthetic effects.
1. Build (2) roof panels minimum 48" x 48" to demonstrate the two color selections that are being considered.

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1.4 WARRANTY

A. Manufacturer's Warranty: Concrete Roof Tile and Underlayment.

1. Warranty Period:

- a. Concrete Roof Tile: Limited Lifetime, Fully Transferable, Non-Prorated.
- b. Underlayment – Boral TileSeal: 30 year material warranty.

**PART 2 - PRODUCTS**

2.1 CONCRETE TILE

A. Products: Subject to compliance with requirements, provide the following roof tile products:

1. Boral Barcelona 900 Florida Blend
2. Alternate Boral Barcelona 900 Burnt Mission

B. Concrete Tile: ASTM C 1492, molded- or extruded-concrete roof tile units of shape and configuration indicated, with integral color, and free of surface imperfections. Provide with fastening holes predrilled at factory when manufactured.

2.2 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

B. Adhesive: Two-component polyurethane adhesive recommended for application by tile manufacturer.

C. Mortar: ASTM C 270, Type M

1. Natural color for concealed-from-view mortar.
2. Mortar Pigment: ASTM C 979. Produce mortar matching the color of tile selected for exposed-to-view mortar.
3. Staining of Mortar: As an alternate means of providing mortar to match the roof tile, the mortar may be stained to achieve the same visual effect.

D. Wood Nailers, Beveled Cant Strip: Comply with requirements in Division 6 Section "Rough Carpentry" for pressure-preservative-treated wood, when required.

E. Trim and Flashing, Gutters and Downspouts: See specification section 074113 Metal Roof Panels.

2.3 FASTENERS

A. Heavy bed of two component polyurethane adhesive recommended by the manufacturer.

2.4 UNDERLAYMENT MATERIALS

- A. Self-Adhering Sheet Underlayment, Boral TileSeal, modified asphalt roofing underlayment

2.5 SHEET METAL FLASHING AND TRIM

- A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7 Section "Flashing and Sheet Metal"
  - 1. Sheet Metal: Galvanized Metal – color to be determined.

**PART 3 - EXECUTION**

3.1 UNDERLAYMENT INSTALLATION

- A. General: Install underlayments according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
- B. Self-Adhering Sheet Underlayment: Install wrinkle free, complying with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches, staggered 24 inches between succeeding courses. Roll laps with roller. Cover underlayment within seven days.

3.2 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Flashing and Sheet Metal."
  - 1. Install metal flashings according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.3 WOOD NAILERS

- A. Install wood nailers when required by roof system design.
- B. Install beveled wood cant when recommended by manufacturer or required by roof system design.

3.4 CONCRETE TILE INSTALLATION

- A. General: Install roof tiles according to manufacturer's written instructions and recommendations in FRSA/Roof Tile Institute Concrete and Clay Roof Tile Installation Manual and to NRCA's "The NRCA Roofing and Waterproofing Manual."

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1. Install in strict adherence to FRSA Roof Tile Institute System 4 B.
2. Maintain uniform exposure and coursing of tiles throughout roof.
3. Extend tiles 2 inches over eave fascia.
4. Set lightweight tiles in heavy pad of two component adhesive applied directly to underlayment.
5. Cut and fit tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
6. Install tiles with color blend mortar, or staining of mortar as approved by Architect.

END OF SECTION 073216

## **SECTION 076200 - SHEET METAL FLASHING AND TRIM**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

A. Section Includes:

1. Manufactured reglets and counterflashing.
2. Formed roof drainage sheet metal fabrications.
3. Formed steep-slope roof sheet metal fabrications.
4. Formed wall sheet metal fabrications.

#### 1.2 SUBMITTALS

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

B. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.

C. Samples: For each exposed product and for each finish specified.

D. Maintenance data.

E. Warranty: Sample of special warranty.

#### 1.3 QUALITY ASSURANCE

A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

#### 1.4 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.



## **PART 2 - PRODUCTS**

### **2.1 SHEET METALS**

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
  - 1. Non-Patinated Exposed Finish: Mill.
  - 2. Pre-Patinated Copper-Sheet Finish: pre-patinated according to ASTM B 882.
- C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  - 1. As-Milled Finish: One-side bright mill finish.
  - 2. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
  - 3. Factory Prime Coating: Where painting after installation is indicated, pretreat with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of 0.2 mil.
  - 4. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  - 5. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    - a. Color: As indicated.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
- E. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.
  - 2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; structural quality.
  - 3. Surface: Mill phosphatized for field painting or Manufacturer's standard clear acrylic coating on both sides.
  - 4. Exposed Coil-Coated Finish:
    - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
    - b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
    - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat.

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5. Color: As indicated.

## 2.2 UNDERLAYMENT MATERIALS

- A. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.
- B. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- C. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
  1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F .
  2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F.
- D. Slip Sheet: Building paper, 3-lb/100 sq. ft. minimum, rosin sized.

## 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
  4. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- C. Solder:
  1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
  2. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

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- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

#### 2.4 REGLETS

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated].

#### 2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
  - 1. Obtain field measurements for accurate fit before shop fabrication.
  - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
  - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

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- E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder or
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

## 2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
  - 1. Fabricate from the following materials:
    - a. Aluminum: 0.024 inch thick.
    - b. Colored - Minimum 15 color palette.
- B. Downspouts: Fabricate round downspouts and rectangular section downspouts per drawings, complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
  - 1. Fabricate from the following materials:
    - a. Aluminum: 0.024 inch thick.
    - b. Colored - Minimum 15 color palette.

## 2.7 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch.
- B. Valley Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch.
- C. Drip Edges: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch.
  - 2. Colored - Minimum 10 color palette
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch.
  - 2. Colored - Minimum 10 color palette

## 2.8 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch-long, but not exceeding 12-foot-long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings. Form with 2-inch-high, end dams where flashing is discontinuous. Fabricate from the following materials:
  - 1. Aluminum: 0.024 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch-high, end dams. Fabricate from the following materials:
  - 1. Aluminum: 0.032 inch.

## PART 3 - EXECUTION

### 3.1 UNDERLAYMENT INSTALLATION

- A. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage. Apply in shingle fashion to shed water, with lapped and taped joints of not less than 2 inches.
- B. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

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3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  5. Install sealant tape where indicated.
  6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws, metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
1. Do not solder metallic-coated steel and aluminum sheet.
  2. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  3. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
  4. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
- G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

### 3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
  - 1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
  - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
  - 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant.

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- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

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

3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 076200



## **SECTION 079200 - JOINT SEALANTS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes joint sealants for the following applications, including those specified by reference to this Section:
  - 1. Exterior joints in vertical surfaces and horizontal non traffic surfaces.
  - 2. Exterior joints in horizontal traffic surfaces.
  - 3. Interior joints in vertical surfaces and horizontal non traffic surfaces.
  - 4. Interior joints in horizontal traffic surfaces.

#### **1.2 PERFORMANCE REQUIREMENTS**

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

#### **1.3 SUBMITTALS**

- A. Product Data: For each joint-sealant product indicated.
- B. Samples: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- C. Preconstruction field test reports.
- D. Compatibility and adhesion test reports.
- E. Product test reports.

#### **1.4 QUALITY ASSURANCE**

- A. Preconstruction Compatibility and Adhesion Testing: Submit samples of materials that will contact or affect joint sealants to joint-sealant manufacturers for testing according to manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

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- B. Preconstruction Field-Adhesion Testing: Before installing elastomeric sealants, field test their adhesion to Project joint substrates according to the method in ASTM C 1193 that is appropriate for the types of Project joints.

1.5 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

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

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles, except that there will be no substitutions for the Dow Corning CCS.

2.2 MATERIALS, GENERAL

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

2.3 ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

- B. Stain-Test-Response Characteristics: Where elastomeric sealants are specified to be non staining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

- C. Suitability for Immersion in Liquids. Where elastomeric sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247 and qualify for the length of exposure indicated by reference to ASTM C 920 for Class 1 or 2. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Single-Component Nonsag Urethane Sealant:
  - 1. Products:
    - a. Sonneborn, Division of ChemRex Inc.; NP 1.
    - b. Tremco; Vulkem 116.
  - 2. Type and Grade: S (single component) and NS (nonsag).
  - 3. Class: 25.
  - 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
  - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
- E. Single-Component Pourable Urethane Sealant:
  - 1. Products:
    - a. Sonneborn, Division of ChemRex Inc.; SL 1.
    - b. Tremco; Vulkem Nova 300 SSL.
  - 2. Type and Grade: S (single component) and P (pourable).
  - 3. Class: 25.
  - 4. Uses Related to Exposure: T (traffic) and NT (nontraffic).
  - 5. Uses Related to Joint Substrates: M, G, A, and, as applicable to joint substrates indicated, O.
- F. Single Component Low Modulus Silicone Joint Sealant
  - 1. Products:
    - a. Dow Corning Contractors Concrete Sealant, no substitutions.

#### 2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), O (open-cell material), B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size

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and density to control sealant depth and otherwise contribute to producing optimum sealant performance:

- C. Elastomeric Tubing Sealant Backings: Neoprene, butyl, EPDM, or silicone tubing complying with ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control sealant depth, and to otherwise contribute to optimum sealant performance.
- D. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. 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 joint sealants.
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant.
    - a. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air.
  - 2. Remove laitance and form-release agents from concrete.

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- a. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- 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 according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  1. Remove excess sealant from surfaces adjacent to joints.
  2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

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3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.
- F. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.3 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior vertical and horizontal non-traffic construction joints in cast-in-place concrete.
1. Joint Sealant: Single-component nonsag urethane sealant.
  2. Joint-Sealant Color: Match adjacent surface.
- B. Joint-Sealant Application: Exterior horizontal non-traffic and traffic isolation and contraction joints in cast-in-place concrete slabs.
1. Joint Sealant: Single-component pourable urethane sealant.
  2. Joint-Sealant Color: Match adjacent surface.
- C. Joint-Sealant Application: Exterior vertical and horizontal non-traffic joints between cast stone units.
1. Joint Sealant: Single-component low modulus silicone joint sealant.
  2. Joint-Sealant Color: Match adjacent surface.
- D. Joint-Sealant Application: Exterior vertical control and expansion joints in unit masonry.
1. Joint Sealant: Single-component nonsag urethane sealant.
  2. Joint-Sealant Color: Match adjacent surface.
- E. Joint-Sealant Application: Exterior perimeter joints between brick or stucco and frames of doors, windows and louvers.
1. Joint Sealant: Single-component nonsag urethane sealant.
  2. Joint-Sealant Color: Match adjacent surface.
- F. Joint-Sealant Application: Interior perimeter joints of exterior openings.
1. Joint Sealant: Single-component nonsag urethane sealant.
  2. Joint-Sealant Color: Match adjacent surface.

END OF SECTION 079200

## SECTION 081113- HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Hollow metal doors and frames.
2. Specific Florida product approved hardware requirements.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Include elevations, door edge details, 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.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURER

- A. Manufacturer: Provide the following:
1. Curries 707 Series; an Assa Abloy Group company.
  2. If a substitution is offered, provide the appropriate Florida Product Approval Number.

#### 2.2 MATERIALS

- A. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), G90 Galvanized.
- B. Frame Anchors: Steel sheet complying with ASTM A 1008 or ASTM A 1011, hot-dip galvanized.
- C. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- D. Grout: 2000 P.S.I Mortar.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.

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2.3 HOLLOW METAL DOORS AND FRAMES

A. General:

1. Designs:
  - a. Flush with Embossed Panels.
    1. Door Face: 16 GA
    2. Frame: 14 GA
    3. Core: Steel Stiffened Polystyrene

2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. to match coursing and as follows:
  - a. Three anchors per jamb.

2.5 HARDWARE REQUIREMENTS

- A. Coordinate with finish hardware schedule.

2.6 STEEL FINISHES

- A. Finish: Shop Prime Field Paint – See Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow Metal Doors and Frames:

1. Prepare doors and frames from templates for hardware items.
2. Prepare doors and frames from templates for hardware items.

3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.



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END OF SECTION 081113

## **SECTION 081433 - STILE AND RAIL WOOD DOORS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Interior stile and rail wood doors.
  - 2. Priming and finishing stile and rail wood doors.
  - 3. Fitting stile and rail wood doors to frames and machining for hardware.
  - 4. Prehanging doors in frames.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- 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 other pertinent data.
- C. Samples: Representing typical range of color and grain for each species of veneer and solid lumber required.

#### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. General: Use only materials that comply with referenced standards and other requirements specified. Assemble exterior doors and sidelites with wet-use adhesives.

#### 2.2 INTERIOR STILE AND RAIL WOOD DOORS

- A. Interior Stile and Rail Wood Doors: Interior doors complying with AWI's "Architectural Woodwork Quality Standards," and with other requirements specified.
  - 1. Manufacturers Interior Doors:
    - a. Architectural Traditions
  - 2. Manufacturers Exterior Doors:
    - a. Jeld-Wen

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3. Grade: Custom.
4. Finish: Opaque.
5. Wood Species: Alder
  
6. Door Construction for Opaque Finish:
  - a. Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
  - b. Stile and Rail Construction: Veneered, structural composite lumber
  - c. Raised-Panel Construction: Clear softwood lumber; edge glued for width.
  - d. Raised-Panel Construction: Shaped, medium-density fiberboard.
  
7. Raised-Panel Thickness: Manufacturer's standard, but not less than 1 1/8".
  
8. Glass: Uncoated, clear, complying with Division 08 Section "Glazing."

### 2.3 STILE AND RAIL WOOD DOOR FABRICATION

- A. Fabricate stile and rail wood doors in sizes indicated for field fitting.
  
- B. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
  1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/2 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than 3/8 inch from bottom of door to top of threshold.
  
  2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
  
- C. Factory machine doors for hardware that is not surface applied.
  
- D. Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing." Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
  
- E. Prehung Doors: Provide stile and rail doors as prehung units including doors, frames, and hardware.
  1. Provide wood door frames that comply with Division 06 Section "Interior Finish Carpentry".
  2. Provide hardware that complies with Division 08 Section "Door Hardware."

### 2.4 SHOP PRIMING

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

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2.5 FINISHING

- A. Wood doors that are indicated to receive opaque finish may be field finished.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Install wood doors to comply with manufacturer's written instructions, AWI's "Architectural Woodwork Quality Standards and other requirements specified.
- C. Field-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 with fire-rated doors. Machine doors for hardware. Seal cut surfaces 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, except where noted otherwise. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold.
  - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

END OF SECTION 081433

## **SECTION 082100 – ALUMINUM CLAD WOOD COMMERCIAL DOOR**

### PART 1 GENERAL

#### 1.1 Section Includes

- A. Aluminum Clad Wood Commercial Door and Frame, complete with hardware, glazing, weather strip, removable grille, simulated divided lite, stationary sidelite, stationary transom, jamb extension, and standard or specified anchors, trim and attachments.

#### 1.2 Related Sections

- A. Section 079200 Joint Sealants
- B. Section 087100 Door Hardware
- C. Section 099100 Painting
- D. Section 088000 Glazing

#### 1.3 References

- A. WDMA I.S.4: Industry Standard for Water Repellent Preservative Treatment Millwork
- B. Sealed Insulating Glass Manufacturers Association / Insulating Glass Certification Council (SIGMA/IGCC)
- C. American Architectural Manufacturers Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- D. American Society for Testing and Materials (ASTM): E330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

#### 1.4 System Description

- A. Design and Performance Requirement. Design Pressure is applicable to individual units and may vary with unit size. (2 ¼" Door only)
  - 1. Units shall be designed to comply with ASTM E330 for structural performance. SHED DP +40/-40 psf (with removable mullion rim device & vertical locking rods) and SHED DP +25/-25 psf (with removable mullion and rim device)

#### 1.5 Submittals

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- A. Shop Drawings: Submit manufacturer's shop drawings, indicating dimensions, construction, component connections and locations, anchorage methods and locations, hardware locations and installation details.
- B. Protect Data: Submit manufacturer's product data, including installation instructions.
- C. Samples: Submit full sized or partial full sized sample of door illustrating glazing system, quality of construction and color of finish.
- D. Warranty: Submit manufacturer's standard warranty.

1.6 Quality Assurance

A. Mockup:

- 1. Provide sample installation for field testing door performance requirements and to determine acceptability of door installation methods.

1.7 Delivery, Storage and Handling

- A. Delivery: Deliver materials to site undamaged in manufacturer's or sales branch's original, unopened containers and packaging, with labels clearly identifying manufacturer and product name. Include installation instructions.
- B. Prime and seal wood surfaces, including to be concealed by wall construction, if more than thirty (30) days will expire between delivery and installation.
- C. Store window units in an upright position in a clean and dry storage area above ground to protect from weather.

PART 2 PRODUCTS

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

- A. Marvin
- B. Pella
- C. Anderson
- D. Windsor

2.2 Manufactured Units

- A. Description: Factory assembled Aluminum Clad Commercial Door.

2.3 Frame Description

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- A. Finger jointed, edge-glued Pine core with clear pine veneer.
  - 1. Kiln dried to moisture content no greater than twelve (12) percent at the time of fabrication.
  - 2. Water repellent, preservative treated in accordance with WDMA I.S.4.
- B. Frame width: 4 9/16" (116mm)
- C. Frame thickness: 1 1/16" (27mm)
- D. Exterior extruded aluminum clad 0.050" (1.3mm) thick
- E. Standard factory installed thermal barrier saddle low profile .500" (13mm) by 7.125" (181mm) sill.

### 2.3 Panel Description

- A. 1 3/4" Doors: Stiles contain laminated veneer lumber (LVL) core with clear Pine, White Oak, Cherry, Mahogany, Mixed Grain Douglas Fir, Cedro Macho veneers. Solid wood top, bottom and intermediate rails.
  - 1. Kiln dried to moisture content no greater than twelve (12) percent at time of fabrication.
  - 2. Water repellent, preservative treated in accordance with WDMA I.S.4.
- B. 2 1/4" Doors: Stiles and top rail contain laminated veneer lumber (LVL) core with clear Pine veneers. Solid wood bottom and intermediate rails.
- C. Composite panel thickness: 1 3/4" (44mm); 2 1/4" (57mm)
- D. Exterior extruded aluminum clad 0.055" (1.4mm) thick
- E. Top rail width: 1 3/4" panel: 6" (152mm) or 2 1/4" panel: 8 1/8" (206mm)
- F. Stile width: 6" (152mm)
- G. Bottom rail height: 11 3/8" (289mm)
- H. Panel corners glued and fastened with 5/8" x 4" (16mm x 102mm) fluted hardwood dowels. Removable interior vinyl glazing stops with clear wood covers. 1 3/4" panel: no visible fastener holes; 2 1/4" panel: visible nail fastener on glazing stop.

### 2.4 Glazing

- A. Select quality complying with ASTM C1036. Comply with 16 CFR 1201 Safety Standard for Architectural Glazing Materials. Tempered insulating glass IGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E774.
- B. Glazing Method: Tempered Insulating Glass

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- C. Glass Type: Glazing method: Insulating glass.
  - 1. Insulating, clear loE 272 with Argon
  - 2. U-Factors: NFRC100 expressed as Btu/sq. ft. x h x deg F minimum U-value 0.5.
  - 3. Solar Heat Gain Coefficient: NFRC 200, maximum SHGC .27.
  - 4. Solar Optical Properties: NFRC 300.
- D. Glazing Seal: Silicone bedding, exterior.

## 2.5 Finish

- A. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements.
  - 1. Color: As indicated or as selected from Manufacturer's full range of colors.
- B. Interior Finish Options:
  - 1. Prime: Factory applied enamel primer.

## 2.6 Hardware

- A. Hinges: 4 ½" x 4 ½" square corner ball bearing hinges.
  - 1. Finish: Bronze (US10A) over brass substrate.
- B. Locking System:
  - 1. Mortised and keyed multi-point locking system. 7/8 inch center dead bolt and shoot-bolts at head and sill shall engage simultaneously.
- C. Hardware Routs and Preps.
  - 1. As indicated on Hardware Schedule, prep doors for exit device hardware.

## 2.7 Weather Strip

- A. Head jamb and hinge jamb: bulb type weather strip.
- B. Locking jamb: gray pile weather strip
- C. Bronze Anodize aluminum panel drip and sweep across panel bottom.

## 2.13 Accessories and Trim

- A. Installation and hardware Accessories:
  - 1. Factory installed vinyl nailing fin/drip cap
  - 2. Installation brackets: 6 3/8" (162mm); 9 3/8" (238mm); 15 3/8" (390mm)



3. Masonry brackets: 6" (152mm); 10" (254mm)

## PART 3 EXECUTION

### 3.1 Examination

- A. Verification of Condition: Before installation, verify openings are plumb, square and of proper dimensions. Report frame defects or unsuitable conditions before proceeding,
- B. Acceptance of Condition: Beginning on installation confirms acceptance of existing conditions.

### 3.2 Installation

- A. Assemble and install window/door unit(s) according to manufacturer's instruction and reviewed shop drawing.
- B. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 079200 Joint Sealants. Do not use expansive foam sealant.
- C. Install accessory items as required.
- C. Use finish nails to apply wood trim and mouldings.

### 3.3 Cleaning

- A. Remove visible labels and adhesive residue according to manufacturer's instruction.
- B. Leave windows and glass in a clean condition. Final cleaning as required in Section 01 74 00.

### 3.4 Protecting Installed Construction

- A. Protecting windows from damage by chemicals, solvents, paint or other construction operations that may cause damage.

End of Section 082100

## **SECTION 083200 – FIBERGLASS DOORS AND FRAMES**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Fiberglass Doors.
    - a. Pre-hung at factory.
    - b. Site hung in frames.
- B. Related Sections:
  - 1. 087100 – Finish Hardware

#### **1.2 DESIGN REQUIREMENTS**

- A. Structural Requirements – Provide doors capable of complying with requirements indicated on the structural drawings.
- B. Impact (Windborne-Debris) Resistance – this project is not located in the windborne debris region.

#### **1.3 SUBMITTALS**

- A. Product Data: For each type of door indicated.
- B. Samples: Provide finish samples for all products.
- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate doors to be factory finished and finish requirements.

#### **1.4 DELIVERY, STORAGE AND HANDLING**

- A. Deliver doors, materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.

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- B. Store doors as recommended by manufacturer.

1.5 WARRANTY

- A. Manufacturer standard warranty indicating that doors will be free from material and workmanship defects from the date of substantial completion for the time periods indicated below:
  - 1. Door System: 25 Years.

**PART 2 - PRODUCTS**

2.1 PRODUCTS

- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the work include, but are not limited to, the following:
  - a. Jeldwen Premium Fiberglass, Architectural Collection

2.2 MANUFACTURERS

- 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Jeldwen

2.3 MATERIALS

- A. Fiberglass Skins: Long Fiber Injection (LFI) Technology, incorporating multiple layers of resins, tinted resins, base colors and reinforcing materials.
- B. Stiles and Rails: Engineered wood (laminated veneer lumber).
- C. Core: Polyurethane core.

2.4 FIBERGLASS ENTRANCE DOORS

- A. Thickness: 1-3/4 inch
- B. Door Style: Solid, Paneled
- C. Door Shape: Squared Top.
  - 1. Panels per Face: One
  - 2. Top Panel Shape(s): Squared
- D. Finish
  - 1. Woodgrain Pattern: Mahogany or Oak
    - a. Color: will be painted per architect's material and color selections.

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2.5 FABRICATION

- A. Skins are adhered to engineered wood frames with core materials and bonding agents that permanently lock skin to frame.
- B. Factory fit doors to suit frame-opening and sizes indicated on the Drawings. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Hardware: Coordinate with Section 087100.
  - 1. See Finish Door Hardware Schedule for hardware finish.
  - 2. ADA threshold for pre-hung doors.
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Site-fitted doors: Align in frames with uniform clearances.

3.2 PROTECTION

- A. Protect installed doors from damage.

END OF SECTION 083200

## **SECTION 085200 – ALUMINUM CLAD WOOD WINDOWS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes fixed casement aluminum-clad wood windows.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide windows with the indicated State of Florida product approvals.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of wood window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, and attachments to other work, operational clearances, and installation details.

#### 1.4 QUALITY ASSURANCE

- A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.
- B. Pre-installation Conference: Conduct conference at Project site and review required State of Florida product approval installation instructions.

#### 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Manufacturers:
  - 1. Aluminum-Clad Wood Windows:
    - a. Pella Windows and Doors.

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2.2 MATERIALS

- A. Wood: Clear ponderosa pine or another suitable fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication.

2.3 Aluminum Clad Wood Window

- A. Window Type: Clad fixed casement.

2.2.6 FINISHES

- B. Factory-Primed Windows: Provide manufacturer's standard factory-prime coat on interior.  
Color: Vanilla Cream.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Comply with Florida Product Approval Installation Instructions
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- E. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- G. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- H. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 085200

## **PART 1 GENERAL**

### 1.1 SECTION INCLUDES

- A. Aluminum Clad Ultimate Casement, Stationary and Picture units complete with hardware, glazing, weather strip, simulated divided lite, jamb extension, and standard or specified anchors, trim and attachments.

### 1.2 RELATED SECTIONS

- A. Section 079200 Joint Sealants
- B. Section 088000 Glazing
- C. Section 099100 Painting

### 1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. E 283: Standard Test Method for Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors.
  - 2. E 330: Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
  - 3. E 547: Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Differential.
  - 4. E 2190: Specification for Sealed Insulated Glass Units.
  - 5. C 1036: Standard Specification for Flat Glass.
  - 6. F2090-10: Standard Specification for Window Fall Prevention Devices with Emergency Escape (egress) Release Mechanisms.
- B. WDMA I.S.4: Industry Standard for Water Repellent Preservative Treatment for Millwork.
- C. American Architectural Manufacturers Association/Window and Door Manufacturers Association (AAMA/WDMA): ANSI/AAMA/WDMA 101/I.S.2-97 Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors. And 101/I.S.2/NAFS-02 Voluntary Performance Specification for Windows, Skylights, Glass Doors and AAMA/WDMA/CSA 101/I.S.2/A440-05 Standard/Specification for windows, skylights and doors and AAMA/WDMA/CSA 101/I.S.2/A440-08, *NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights...*
- D. Windows and Door Manufacturers Association (WDMA): 101/I.S.2 WDMA Hallmark Certification Council Program.
- E. Sealed Insulating glass Manufacturers Association/Insulating Glass Certification Council (SIGMA/IGCC).
- F. American Architectural Manufacturers Association (AAMA): 2605: Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions and Panels.
- G. National Fenestration Rating Council (NFRC): 101: Procedure for Determining Fenestration Product Thermal Properties.

### 1.4 SUBMITTALS

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- A. Shop Drawings: Include plans, elevations, sections, details, hardware and attachments to other work, operational clearances and installation details.
- B. Product Data: Submit catalog data for each type of window indicated.
- C. Samples:
  - 1. Submit corner section.
  - 2. Include glazing system, quality of construction, and specified finish.
  - 3. Quality Control Submittals: Certificates: Submit manufacturer's certifications indicating compliance with specified performance and design requirements.

#### 1.5 QUALITY ASSURANCE

- A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original packaging and protect from weather.
- B. Prime or seal wood surfaces.
- A. Store window units in an upright position in a clean and dry storage area above ground and protect from weather.

#### 1.9 WARRANTY

- A. Windows shall be warranted to be free from defects in manufacturing, materials, and workmanship for a period of ten (10) from purchase date.
- B. Insulating glass shall be warranted against visible obstruction through the glass caused by a failure of the insulating glass air seal for a period of twenty (20) years from the date of original purchase.

### **PART 2 PRODUCTS**

2.1 MANUFACTURERS: Subject to compliance with requirements, provide products by one of the following.

- A. Marvin
- B. Pella
- C. Anderson
- D. Windsor

#### 2.2 MANUFACTURED UNITS

- A. Description: Factory assembled Clad Ultimate Casement, fixed.

#### 2.2 FRAME DESCRIPTION

- A. Interior: Clear Pine or finger jointed core with clear pine veneer.
  - 1. Kiln dried to moisture content no greater than twelve (12) percent at the time of fabrication.
  - 2. Water repellent preservative treated in accordance with WDMA I.S.4.



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- B. Frame Thickness: 1 3/16 inches (30mm).
- C. Frame Depth: Overall 5 21/32 (144mm) for full frame applications, and 4 9/16 (116mm) jamb depth from the nailing fin plane to the interior face of the frame for new construction.
- D. Frame exterior clad with 0.050 inch (1.3mm) thick extruded aluminum.

### 2.3 SASH DESCRIPTION

- A. Clear Pine standard.
  - 1. Kiln dried to moisture content no greater than twelve (12) percent at the time of fabrication.
  - 2. Water repellent preservative treated in accordance with WDMA I.S.4.
- B. Sash thickness: 1 5/8 inches (41mm) with 3/4 inch (19mm) insulated glass. For 1 inch (25mm) insulated glass sash thickness is 1 7/8 inch (48mm).
- C. Sash exterior clad with 0.050 inch (1.3mm) thick extruded aluminum.

### 2.4 GLAZING

- A. Select quality complying with ASTM C 1036. Insulating glass SIGMA/IGCC certified to performance level CBA when tested in accordance with ASTM E 2190.
- B. Glazing method: Insulating glass.
  - 1. Insulating, clear loE 272 with Argon
  - 2. U-Factors: NFRC100 expressed as Btu/sq. ft. x h x deg F minimum U-value 0.5.
  - 3. Solar Heat Gain Coefficient: NFRC 200, maximum SHGC .27.
  - 4. Solar Optical Properties: NFRC 300.
- C. Glazing seal: Silicone bedding at interior and exterior.

### 2.5 FINISH

- A. Exterior: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets or exceeds AAMA 2605 requirements.
  - 1. As indicated or as selected from manufacturer's full range.
- B. Interior: Treated bare wood; Latex prime coat, white-available for Pine wood species only.

### 1.6 WEATHER STRIP

- A. Weather stripping at frame is a hollow foamed material bent around 90 degree corner to allow for seamless corner joints beige in color. Sash weather strip is bulb shaped glass filled material, available in beige, white or black.

### 2.9 SIMULATED DIVIDED LITES (SDL)

- A. 5/8 inch (16mm), 3/4 inch (19mm), 1 1/8 inch (29), 1 3/4 inch (44), and 2 13/32 inch (61) wide, with or without spacer bars.
  - 1. Exterior Muntins: 0.055 inch (1.4mm) thick extruded aluminum.
  - 2. Interior Muntins: Pine. Muntins adhered to glass with closed-cell copolymer acrylic foam tape.
  - 3. Pattern: Rectangular; Custom lite layout.

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4. Finish; Exterior-Match clad color, Interior-Match wood species.
5. Provide spacer bar.

## 2.10 ACCESSORIES AND TRIM

### A. Installation Accessories:

1. Factory installed vinyl nailing fin/drip cap.
2. Installation brackets; 6 3/8 inch (162mm); 9 3/8 inch (238mm); 15 3/8 inch (390mm).
3. Masonry brackets: 6 inch (152mm); 10 inch (254mm).

### B. Aluminum Extrusions:

1. Profile: Brick Mould Casing; Flat Casing; Various Special Casings; Frame Expanders; Jamb Extenders; Mullion Covers; Mullion Expanders; Aluminum accessory kerf cover as indicated on drawings.
  - a. Finish: Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Before Installation, verify openings are plumb, square, and of proper dimension. Report frame defects or unsuitable conditions before proceeding.
- B. Acceptance of Conditions: Beginning of Installation confirms acceptance of existing conditions.

### 3.2 INSTALLATION

- A. Assemble and install window unit/s according to manufacturer's instructions and reviewed shop drawings.
- B. Install sealant and related backing materials at perimeter of unit or assembly in accordance with Section 079200 Joint Sealants. Do not use expansive foam sealant.
- C. Install accessory items as required.
- D. Use finish nails to apply wood trim and mouldings.

### 3.3 CLEANING

- A. Remove visible labels and adhesive residue according to manufacturer's instructions.
- B. Leave windows and glass in a clean condition. Final cleaning as required in Section 01 74 00.

### 3.4 PROTECTING INSTALLED CONSTRUCTION

- A. Protect windows from damage by chemicals, solvents, paint, or other construction operations that may cause damage.

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END OF SECTION 085200

**SECTION 087100 – DOOR HARDWARE**

PART 1 – GENERAL

1.01 DESCRIPTION

- A. Work Included: Finish hardware and fasteners
- B. Related Work Specified Elsewhere:
  - 1. Hollow metal doors and frame: Section 081113

1.02 SUBMITTALS

- A. Hardware Schedule:
  - 1. Submit complete schedule of all finish hardware required.
  - 2. Include for each item: Manufacturer's name and catalog number, finish, location and keying information.
  - 3. Approval of schedule will not relieve the hardware supplier of responsibility for furnishing all hardware necessary for complete installation.
- B. Samples: Upon request of Architect, submit samples, plainly marked indicating part of work for which proposed.
- C. Catalog: Submit catalog cut sheets for all items where manufacturer substitution is made from those manufacturers specified in this section.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Packaging: Pack all items individually and properly mark for each door opening, so as to be readily identifiable with door and hardware schedule.
- B. Templates:
  - 1. Prepare hardware for application to metal and wood doors to standard templates.
  - 2. Furnish template information to door and frame fabricators as soon as hardware schedule has been approved.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Manufacturers: As selected by Architect and approved by submission of cut sheet data to Architect.

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- B. Fastening: Provide all screws, anchor bolts and other fastening devices in appropriate matching finish as required to secure each item of hardware.
- C. Keying: Unless otherwise noted, master key all lock sets and key each lock set differently. Provide 3 keys for each lock, and 3 master keys.

2.02 FINISH HARDWARE GROUPS

- A. Hardware groups are to be established by the contractors' architectural hardware consultant and submitted to the Architect for review.

PART 3 – EXECUTION

3.01 WORKMANSHIP

- A. Installation
  - 1. Install finish hardware to templates and manufacturer's instructions and adjust for smooth, quiet and proper operation.
  - 2. Cover doorknobs and other surfaces while the area is being finished.
  - 3. Remove paint or other foreign matter from exposed surfaces thoroughly.
  - 4. Any hardware that becomes damaged in operation or finish shall be replaced.

END OF SECTION 087100

## **SECTION 088300 - MIRRORS**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Safety backed film glass mirrors.

#### **1.2 SUBMITTALS**

- A. Product Data: For mirror hardware and mastic.
- B. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- C. Product Certificates: For each type of mirror and mirror mastic, signed by product manufacturer.
- D. Mirror Mastic Compatibility Test Reports: From mirror manufacturer.

#### **1.3 QUALITY ASSURANCE**

- A. Glazing Publications: Comply with GANA's "Glazing Manual" and GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors" unless more stringent requirements are indicated
- B. Safety Glazing Products: For film-backed mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- C. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing film and substrates on which mirrors are installed.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors, protected from moisture including condensation.

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1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form, made out to Owner and signed by mirror manufacturer agreeing to replace mirrors that deteriorate, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated in second subparagraph below.
  - 1. Deterioration of Mirrors: Defects developed from normal use that are attributable to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning mirrors contrary to mirror manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
  - 2. Warranty Period: Five years from date of Substantial Completion.

**PART 2 - PRODUCTS**

2.1 SILVERED FLAT GLASS MIRROR MATERIALS

- A. Clear Glass Mirrors: Comply with ASTM C 1503, Mirror Glazing Quality, for blemish requirements in annealed float glass before silver coating is applied, for coating requirements, and comply with ASTM C 1048 for Kind FT, Condition A, float glass before silver coating is applied.
  - 1. Nominal Thickness: 1/4".

2.2 MISCELLANEOUS MATERIALS

- A. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
- B. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- C. Mirror Mastic: An adhesive setting compound, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

2.3 MIRROR HARDWARE

- A. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
  - 1. Bottom Trim: J-channels formed with front leg and back leg not less than 3/8 and 7/8 inch in height, respectively.
  - 2. Top Trim: J-channels formed with front leg and back leg not less than 5/8 and 1 inch in height, respectively.

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- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

## 2.4 FABRICATION

- A. Mirror Sizes: To suit Project conditions, cut mirrors to final sizes and shapes.
- B. Cutouts: Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished edge.
  - 1. Seal edges of mirrors after edge treatment to prevent chemical or atmospheric penetration of glass coating.
  - 2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
- D. Film-Backed Safety Mirrors: Apply film backing with pressure-sensitive adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections. Use adhesives and film backing compatible with mirror backing paint as certified by mirror manufacturer.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. For wall-mounted mirrors, install with mastic and mirror hardware.
  - 1. 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.
  - 2. For mirror hardware in the form of a continuous J-channel at bottom and continuous top trim at top, fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.



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3. Where indicated, install mirror hardware in the form of J-channels that are fabricated in single lengths to fit and cover top and bottom edges of mirrors.
4. Install mastic as follows:
  - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
  - b. Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
  - c. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch between back of mirrors and mounting surface.
- D. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- E. Do not permit edges of mirrors to be exposed to standing water.
- F. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.

END OF SECTION 088300

## **SECTION 089000 – LOUVERS AND VENTS**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. Fixed, extruded-aluminum louvers.
- B. See Division 15 Sections for louvers that are a part of mechanical equipment.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Meet requirements of Florida Product Approval.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

### **PART 2 - PRODUCTS**

#### 2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B 221

#### 2.2 FABRICATION, GENERAL

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Manufacturer: Greenheck
- B. Type EHH-501X
- C. Cover back of louvers with sheet aluminum when indicated.
  - 1. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
- D. Provide aluminum insert screens covered with security mesh on functional louvers (interior side).

2.4 ALUMINUM FINISHES

- A. High-Performance Organic Finish: 3 coat fluoropolymer finish.
  - 1. Color: Custom color provided by architect.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Install in strict accordance with state of Florida product approval instructions.
- B. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
- C. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

END OF SECTION 089000

## **SECTION 092400 - PORTLAND CEMENT PLASTERING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

A. This Section includes the following:

1. Portland cement stucco on metal lath and Portland cement stucco on concrete masonry units.

#### **1.2 RELATED SECTIONS**

A. 072413 Polymer-Based Exterior Insulation and Finish System

#### **1.3 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Samples: For each exposed finish and texture required.
- C. Material Certificates: For aggregates.

#### **1.4 QUALITY ASSURANCE**

- A. Mockups: Install mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Mock up shall include finish texture and color.

#### **1.5 PROJECT CONDITIONS**

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork: Apply plaster when ambient temperature is greater than 40 deg F.

#### **1.6 ACCESSORIES**

- A. General: ASTM C 1063. Coordinate depth of accessories with thicknesses and number of plaster coats required.
- B. Plastic Corner Reinforcement: Expanded specially formed to reinforce external corners of portland cement plaster on exterior exposures while allowing full plaster encasement.
  1. PVC Plastic: Minimum 0.035 inch thick.

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C. Control Joints: Prefabricated with removable protective tape on plaster face of control joints.

1. Material: PVC

1.7 LATH

A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.

1. Diamond-Mesh Lath: Flat.
  - a. Weight: 2.5 lb/sq. yd.
2. Flat Rib Lath: Rib depth of not more than 1/8 inch .
  - a. Weight: 2.75 lb/sq. yd.

B. Wire-Fabric Lath:

1. Welded-Wire Lath: ASTM C 933; self-furring.
  - a. Weight: 1.4 lb/sq. yd.
2. Woven-Wire Lath: ASTM C 1032; self-furring, with stiffener wire backing.

C. Plastic Lath:

1. Plastic components Ultra-Lath.

1.8 PLASTER MATERIALS

A. Base-Coat Cements: Portland cement, ASTM C 150, Type I.

B. Job-Mixed Finish-Coat Cement: Portland cement, ASTM C 150, Type I.

1. Cement Color: Gray.

C. Stucco Finish Coat: Manufacturer's standard factory-packaged stucco, including portland cement, aggregate, and other proprietary ingredients.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Florida Stucco Corp.
  - b. Highland Stucco.
  - c. IPA Systems, Inc.
  - d. United States Gypsum Co.

D. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S; or special hydrated lime for masonry purposes, ASTM C 207, Type S.

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- E. Sand Aggregate for Base Coats: ASTM C 897.
- F. Aggregate for Finish Coats: ASTM C 897 system, manufactured or natural sand.
- G. See Section 072413 for Acrylic finish coat.

1.9 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable.
- B. Bonding Agent: ASTM C 932.
- C. Acid-Etching Solution: Muriatic acid (10 percent solution of commercial hydrochloric acid) mixed 1 part to not less than 6 nor more than 10 parts water.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of not fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.

1.10 PLASTER MIXES AND COMPOSITIONS

- A. General: Comply with ASTM C 926.
  - 1. Base-Coat Mixes and Compositions: Adjust mix proportions within limits specified to attain workability.
- B. Two-Coat Work over Concrete Unit Masonry:
  - 1. Base Coat Mix: 1 part portland cement, 3/4 to 1-1/2 parts lime, 3 to 4 parts aggregate .
- C. Three-Coat Work over Metal Lath:
  - 1. Scratch and brown coats for three-coat plasterwork as follows:
    - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
    - b. Brown Coat: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material (sum of separate volumes of each component material).
- D. Job-Mixed Finish Coats:
  - 1. Mixes with Sand Aggregates: 1 part portland cement, 1 part masonry cement, 3 parts sand.

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- E. Factory-Prepared Finish Coats: Add water only; comply with finish coat manufacturer's written instructions.

## **PART 2 - EXECUTION**

### **2.1 PREPARATIONS FOR PLASTERING**

- A. Protect contiguous Work from damage and deterioration caused by plastering with temporary covering and other provisions necessary.
- B. Clean plaster bases and substrates for direct application of plaster, removing loose material and substances that may impair the Work.
- C. Install plastic Lath with corrosion resistant fasteners to masonry according to Lath manufacturer's recommendations.
- D. Install temporary grounds and screeds to ensure accurate rodding of plaster to true surfaces; coordinate with scratch-coat work.
- E. Surface Conditioning: Immediately before plastering, dampen concrete and concrete unit masonry substrates to produce optimum suction for plastering.

### **2.2 PLASTERING ACCESSORIES INSTALLATION**

- A. General: Comply with referenced lathing and furring installation standards for provision and location of plaster accessories. Miter or cope accessories at corners; install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and in alignment during plastering.
  - 1. External Corners: Install corner reinforcement at external corners.
  - 2. Terminations of Plaster: Install casing beads, unless otherwise indicated.
  - 3. Control Joints: Install at locations indicated or, if not indicated, at locations complying with the following criteria and approved by Architect:
    - a. Where an expansion or contraction joint occurs in surface of construction directly behind plaster membrane.
    - b. Distance between Control Joints: Not to exceed 18 feet in either direction or a length-to-width ratio of 2-1/2 to 1.
    - c. Wall Areas: Not more than 144 sq. ft.
    - d. Horizontal Surfaces: Not more than 100 sq. ft. in area.
    - e. Where plaster panel sizes or dimensions change, extend joints full width or height of plaster membrane.

### **2.3 PLASTER APPLICATION**

- A. Plaster Application Standard: Comply with ASTM C 926.

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1. Mixing: Mechanically mix cementations and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.
  2. Do not use materials that are frozen, caked, lumpy, dirty, or contaminated by foreign materials.
  3. Do not use excessive water in mixing and applying plaster materials.
- B. Flat Surface Tolerances: Do not deviate more than plus or minus 1/8 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed at any location on surface.
- C. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.
- D. Corners: Make internal corners and angles square; finish external corners flush with cornerbeads on interior work, square and true with plaster faces on exterior work.
- E. Number of Coats:
1. Concrete Unit Masonry: Minimum two coats.
  2. Concrete, Cast-in-Place or Precast: Minimum two coats.
  3. Metal Lath on Framing: Minimum three coats.
- F. Finish: Acrylic finish as indicated in Section 072413.

#### 2.4 CUTTING, PATCHING, AND CLEANING

- A. Cut, patch, replace, repair, and point up plaster as necessary to accommodate other work. Repair cracks and indented surfaces. Point-up finish plaster surfaces around items that are built into or penetrate plaster surfaces. Repair or replace work to eliminate blisters, buckles, check cracking, dry outs, efflorescence, excessive pinholes, and similar defects. Repair or replace work as necessary to comply with required visual effects.
- B. Remove temporary covering and other provisions made to minimize spattering of plaster on other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair surfaces stained, marred or otherwise damaged during plastering work.

END OF SECTION 092400



## SECTION 092900 - GYPSUM BOARD

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Interior gypsum wallboard.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: For each textured finish indicated and on same backing indicated for Work.

#### 1.3 QUALITY ASSURANCE

- A. Mockups: Before finishing gypsum board assemblies, install mockups of at least 100 sq. ft in surface area to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Install mockups for the following applications:
    - a. Surfaces with texture finishes.
    - b. Surfaces indicated to receive nontextured paint finishes.
    - c. Surfaces indicated to receive textured paint finishes.
  - 2. Simulate finished lighting conditions for review of mockups.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
  - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. American Gypsum Co.

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- b. BPB America Inc.
- c. National Gypsum Company.
- d. USG Corporation.

B. Regular Type:

- 1. Thickness: 5/8 inch.
- 2. Long Edges: Tapered.

C. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.

- 1. Thickness: 5/8 inch.
- 2. Long Edges: Tapered.

D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.

- 1. Core: 5/8 inch.
- 2. Long Edges: Tapered.

## 2.2 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

- 1. Cornerbead: Use at outside corners.
- 2. Bullnose Bead: Use at outside corners.
- 3. LC-Bead: Use at exposed panel edges.
- 4. L-Bead: Use where indicated.
- 5. U-Bead: Use where indicated.
- 6. Expansion (Control) Joint: Use where indicated.
- 7. Curved-Edge Cornerbead: With notched or flexible flanges; use at curved openings.

## 2.3 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

- 1. Interior Gypsum Wallboard: Paper.
- 2. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

- 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
- 2. Embedding and First Coat: For embedding tape and first coat on joints, flanges of trim accessories, and fasteners, use setting-type taping compound.

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- 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 4 finish, use setting-type, sandable topping compound.

## 2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. 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.

## PART 3 - EXECUTION

### 3.1 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- D. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.

### 3.2 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  1. Regular Type: Vertical surfaces, unless otherwise indicated.
  2. Ceiling Type: Ceiling surfaces.
  3. Moisture- and Mold-Resistant Type: All interior of exterior walls and wet areas.

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3.3 APPLYING TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. Bullnose Bead: Use at outside corners.
  - 3. LC-Bead: Use at exposed panel edges.
  - 4. L-Bead: Use where indicated.
  - 5. U-Bead: Use at exposed panel edges.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 5: At panel surfaces that will be exposed to view, unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.

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- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.6 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

## **SECTION 093000 - TILING**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Tile.
  - 2. Tile setting mortars and adhesives
  - 3. Grout for tile

#### 1.2 RELATED SECTIONS

- A. 071416 Waterproofing Systems

#### 1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints.
- C. Samples:
  - 1. Each type, composition, color, and finish of tile.
  - 2. Assembled samples with grouted joints for each type, composition, color, and finish of tile.

#### 1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
  - 1. Build mockup of each type of wall tile installation.
- B. To ensure warranty requirements and compatibility of products, provide all tile grout, setting materials, additives, accessories and factory-prepared dry-set mortars from the same manufacturer.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Prevent damage or contamination to materials by water, freezing, foreign matter or other causes.

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- B. Deliver and store materials on site at least 24 hours before work begins.

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.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to one percent of amount installed, for each type, composition, color, pattern, and size indicated.

1.7 ENVIRONMENTAL REQUIREMENTS

Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.

- A. For interior applications:
  - 1. Do not begin installation until building is completely enclosed and HVAC system is operating and maintaining temperature and humidity conditions consistent with “after occupancy” conditions for a minimum of 2 weeks.
  - 2. Maintain continuous and uniform building temperatures of not less than 50d F during installation.
  - 3. Ventilate spaces receiving tile in accordance with material manufacturer’s instructions.
- B. For exterior applications:
  - 1. Maintain substrate and ambient temperatures in tiled areas between 50d F and 95d F during installation and for at least 7 days after completion, unless otherwise indicated in the product instructions and/or ANSI A108 installation standards.

**PART 2 - PRODUCTS**

2.1 TILE PRODUCTS

- A. As indicated or selected from manufacturer’s full range.

2.2 ACCESSORY MATERIALS

- A. As required, and as shown on the drawings.

2.3 SETTING MORTAR MATERIALS

- A. Exterior Wall Tile
  - 1. Dry-set, thin-set mortar and polymer additive. Flexible polymer-modified Portland cement mortar, complying with ANSI A118.4 and ISO 13007 C2ES2P2.

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- a. Mapei Kerabond/Keralastic System consisting of factory prepared dry-set mortar with Mapei latex additive.
- B. Interior Floor Tile
  1. Premium non-sag, medium-bed and thin-set mortar: Polymer-modified single-component mortar for large format tile complying with ANSI A118.4 and ISO 13007 C2TES1P1, Mapei Ultraflex LFT.
- C. Interior Wall Tile
  1. Premium non-sag, medium bed and thin set mortar: Polymer-modified single-component mortar for large format tile complying with ANSI A118.4 and ISO 13007 C2TES1P1 Mapei Ultraflex LFT.
  2. A single component, thin-set mortar for interior and exterior installations of stone, ceramic, porcelain and quarry tile, complying with ANSI A118.4 and ISO 13007 C2 Ker 111.
  3. A premium-grade bright white, multipurpose thin-set mortar formulated with non-sag properties. Adesilex P10 shall be used for glass tile, glass mosaic and marble mosaic, complying with ANSI A118.4 and ISO 13007 C2TE Adesilex P10.

## 2.4 GROUT MATERIALS

- A. Exterior Wall Tile
  1. Fast-setting sanded polymer-modified grout, complying with ANSI A118.6, ANSI A118.7 and ISO 13007 CG2WAF, for joints between 1/16 inch and 1 inch.
    - a. Mapei Ultracolor Plus, color as selected from manufacturer's full range.
- B. Interior Floor Tile
  1. Fast-setting sanded polymer-modified grout, complying with ANSI A118.6, ANSI A118.7 and ISO 13007 CG2WAF, for joints between 1/16 inch and 1 inch.
    - a. Mapei Ultracolor Plus, color as selected from manufacturer's full range.
- C. Interior Wall Tile
  1. Fast-setting sanded polymer-modified grout, complying with ANSI A118.6, ANSI A118.7 and ISO 13007 CG2WAF, for joints between 1/16 inch and 1 inch.
    - a. Mapei Ultracolor Plus, color as selected from manufacturer's full range.

## 2.5 WATERPROOF MEMBRANE

- A. See Section 071416.

## PART 3 - EXECUTION

### 3.1 PREPARATION



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- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.
- C. Remove protrusions, bumps, and ridges by sanding or grinding.
- D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.
- E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### 3.2 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.
- B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- E. Jointing Pattern: Lay tile in pattern indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated. Joint widths are as indicated by Interior Designer.
- F. Lay out tile wainscots to next full tile beyond dimensions indicated.

### 3.3 GROUTING

- A. Grout joints in accordance with manufacturer's instructions and ANSI A108.10 or ANSI 108.6.
- B. Clean standing water, dust, and foreign substances from joints to be grouted
- C. Clean and dry tile surfaces

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- D. After grouting, remove all grout residues promptly.

3.4 PROTECTION

- A. Protect installed tile work and from damages by other trades and general abuse until substantial work completion and acceptance.
- B. Refer to manufacturer's product data sheet for recommendations regarding protection.

END OF SECTION 093000

## **SECTION 096400 - WOOD FLOORING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes factory finished wood flooring.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples: For each exposed finish.

#### **1.3 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Hardwood Flooring: Comply with NOFMA's "Official Flooring Grading Rules" for species, grade, and cut.
  - 1. Certification: Provide flooring that carries NOFMA grade stamp on each bundle or piece.
- C. 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.
- D. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.
- E. Mockups: Install mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Install mockups as indicated.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.

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- B. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

## 1.5 PROJECT CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
  - 1. Environmental Conditioning: Maintain an ambient temperature between 65 and 75 deg F and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
  - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
    - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
    - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 FACTORY-FINISHED WOOD FLOORING

- A. Solid-Wood, Strip Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; and with backs channeled (kerfed) for stress relief.
  - 1. Products: As indicated.
    - a. Color: As indicated.

### 2.2 ACCESSORY MATERIALS

- A. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than 6.0 mils thick.
- B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
  - 1. Use adhesives that have a VOC content of not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

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- C. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- D. Fasteners: As recommended by manufacturer.
- E. Cork Expansion Strip: Composition cork strip.
- F. Feature Strips: 2-inch wide, square-edged strips furnished in lengths as long as practical and in thickness to match wood flooring. Species of wood as indicated.
- G. Trim: In same species and grade as wood flooring, unless otherwise indicated.
  - 1. Base: As indicated.
  - 2. Base Shoe Molding: As indicated.
  - 3. Threshold: Tapered on each side and routed at bottom of one side to accommodate wood flooring.
  - 4. Reducer Strip: 2 inches wide, tapered on 1 side, and in thickness matching wood flooring.

### **PART 3 - EXECUTION**

#### **3.1 PREPARATION**

- A. For adhesively applied wood flooring, verify that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Concrete Substrates:
  - 1. Moisture Testing: Perform anhydrous calcium chloride test per ASTM F 1869.
  - 2. Grind high spots and fill low spots on concrete substrates to produce a maximum 1/8-inch deviation in any direction when checked with a 10-foot straight edge.
    - a. 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.
- C. 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.

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3.2 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions.
- B. Provide expansion space at walls and other obstructions and terminations of flooring as indicated.
- C. Vapor Retarder:
  - 1. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.
- D. Wood Trim: Nail baseboard to wall and nail shoe molding or other trim to baseboard; do not nail to flooring.

3.3 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
  - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

## **SECTION 096813 - TILE CARPETING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes carpet.

#### **1.2 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include the following:
  - 1. Transition, and other accessory strips.
  - 2. Transition details to other flooring materials.
- C. Samples: For each for each carpet and exposed accessory and for each color and pattern required.
- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Maintenance data.

#### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

#### **1.4 PROJECT CONDITIONS**

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by manufacturer.

1.5 WARRANTY

- A. Carpet Warranty: Manufacturer's standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within 10 years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

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**

- A. As indicated.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.
- D. Install pattern parallel to walls and borders.

END OF SECTION 096813



## **SECTION 096816 - SHEET CARPETING**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes carpet.

#### **1.2 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include the following:
  - 1. Transition, and other accessory strips.
  - 2. Transition details to other flooring materials.
- C. Samples: For each for each carpet and exposed accessory and for each color and pattern required.
- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Maintenance data.

#### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

#### **1.4 PROJECT CONDITIONS**

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- C. Do not install carpet over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by manufacturer.

1.5 WARRANTY

- A. Carpet Warranty: Manufacturer's standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within 10 years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

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**

- A. As indicated or selected by Interior Designer.

**PART 3 - EXECUTION**

3.1 INSTALLATION

- A. Comply with CRI 104, Section 8, "Direct Glue-Down."
- B. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.
- C. Install pattern parallel to walls and borders.

END OF SECTION 096816

## **SECTION 099100 – PAINTING (Low VOC)**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces.

#### **1.2 RELATED SECTIONS**

- A. Section 072413 Polymer Based Exterior Insulation and Finish System

#### **1.3 SUBMITTALS**

- A. Product Data: For each product indicated.
- B. Samples: For each type of finish-coat material indicated.

#### **1.4 QUALITY ASSURANCE**

- A. Benchmark Samples (three Mockups panels for client approval): Provide a full-coat benchmark finish sample for each type of coating and substrate required.
  - 1. Wall Surfaces: Provide samples on at least 50 sq. ft. on a mock up panel separate from the construction.
    - a. Provide samples for field color and for alternate field color
  - 2. Small Areas and Items: Architect will designate items or areas required.
  - 3. Final approval of colors will be from benchmark samples.

#### **1.5 PROJECT CONDITIONS**

- A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
- B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F.
- C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F.

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- D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

- 1. Quantity: 1 gal. of each material and color applied.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include:

- 1. Benjamin Moore & Co.
- 2. Sherwin Williams

2.2 PAINT MATERIALS, GENERAL

- A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
- C. Colors: As selected from manufacturer's full range.

2.3 PREPARATORY COATS

- A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated. (Benjamin Moore Block Filler #285)
- B. Exterior Primer: Exterior alkyd or latex-based primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.

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1. Ferrous-Metal and Aluminum Substrates: Rust-inhibitive metal primer. Benjamin Moore P07 Universal Metal Primer)
  2. Zinc-Coated Metal Substrates: Galvanized metal primer (Insl-X Aqua-Lock 400).
  3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.
- C. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer (BM P07 Universal Metal Primer).
  2. Zinc-Coated Metal Substrates: Galvanized metal primer (Insl-X Aqua-Lock 400).
  3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.
  4. Gypsum drywall primer (BM Eco Spec primer N372)
- 2.4 EXTERIOR FINISH COATS (based on Benjamin Moore product line)
- A. Exterior Direct To Concrete Coating:
1. Benjamin Moore/ Coronado; Texcrete Breathable Waterproofing (3194)
- B. Exterior Satin Acrylic Paint:
1. Benjamin Moore; Ultra Spec Exterior Satin Finish (N448)
- C. Exterior Semigloss Acrylic Enamel:
1. Benjamin Moore; Regal Select Exterior Soft Gloss Finish (N402)
  2. Retain finish-coat materials below for a full-gloss acrylic-enamel finish over concrete, stucco, masonry, concrete masonry units, gypsum soffit boards, smooth wood, and wood trim. Consult manufacturers if deep-tone-color full-gloss finishes are required. Some deep-tone-color products require use of a different base or a different primer.
- D. Exterior Full-Gloss Acrylic Enamel for Concrete, Masonry, and Wood:
1. Benjamin Moore; Ultra Spec Exterior Gloss Finish (N449)
  2. Retain finish-coat materials below for a full-gloss acrylic-enamel finish over ferrous and zinc-coated metal and aluminum. Consult manufacturers if deep-tone-color full-gloss finishes are required. Some deep-tone-color products require use of a different base or a different primer.
- E. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals:
1. Benjamin Moore; Ultra Spec Exterior Gloss Finish (N449)
  2. Exterior Full-Gloss Alkyd Enamel:
  3. Benjamin Moore; Moore's IMC Urethane Alkyd Enamel P22.
- F. Exterior Semi-Solid Stain for Wood:
1. Benjamin Moore; Moore's Arborcoat Semi-Solid Exterior Stain 639
- 2.5 INTERIOR FINISH COATS (based on Benjamin Moore product line)

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Note: 1 = Low VOC and 2 = No VOC

- A. Interior Flat Acrylic Paint:
  - 1. Benjamin Moore; Ultra Spec Interior Flat No.N536. (No VOC).
- B. Interior Flat Latex-Emulsion Size:
  - 1. Benjamin Moore; Aqua-Lock 400.
- C. Interior Low-Luster Acrylic Enamel:
  - 1. Benjamin Moore; Ultra Spec Interior Eggshell No.N538. (No VOC).
- D. Interior Semigloss Acrylic Enamel:
  - 1. Benjamin Moore; Ultra Spec Interior Semi Gloss No.N539. (No VOC).
- E. Interior Full-Gloss Acrylic Enamel:
  - 1. Benjamin Moore; Ultra Spec Interior Gloss No.N540. (No VOC).
  - 2. Retain finish-coat materials below for a semigloss alkyd finish over interior concrete, stucco, masonry, concrete masonry units, gypsum board, plaster, wood, and ferrous and zinc-coated metal.
- F. Interior Semigloss Alkyd Enamel:
  - 1. Benjamin Moore; Benjamin Moore Advance WB Alkyd 793.
- G. Interior Full-Gloss Alkyd Enamel for Gypsum Board and Plaster:
  - 1. Benjamin Moore; Benjamin Moore Advance WB Alkyd 794.
- H. Interior Full-Gloss Alkyd Enamel for Wood and Metal Surfaces:
  - 1. Benjamin Moore; Benjamin Moore Advance WB Alkyd 794.

### **PART 3 - EXECUTION**

#### **3.1 APPLICATION**

- A. Comply with procedures specified in PDCA P4 for inspection and acceptance of surfaces to be painted.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
- C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

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- D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and reprime.
  2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
  3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
    - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
    - b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
    - c. If transparent finish is required, back prime with spar varnish.
    - d. Back prime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.
    - e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
  4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
    - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
    - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
  5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- E. Material Preparation:
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

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- F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
  - 1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  - 2. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  - 3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  - 4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
  - 5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
- G. Sand lightly between each succeeding enamel or varnish coat.
- H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
  - 1. Omit primer over metal surfaces that have been shop primed and touchup painted.
  - 2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.
- I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
- J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.
- K. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.
- L. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- M. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.
- N. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.



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3.2 CLEANING AND PROTECTING

- A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
- B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
  - 1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.3 EXTERIOR PAINT SCHEDULE

- A. Concrete:
  - 1. Acrylic Finish: Two finish coats over a primer.
    - a. Primer: Exterior concrete and masonry primer.
    - b. Finish Coats: Exterior low-luster acrylic paint.
- B. Concrete Unit Masonry:
  - 1. Acrylic Finish: Two finish coats over block filler.
    - a. Block Filler: Concrete unit masonry block filler.
    - b. Finish Coats: Exterior low-luster acrylic paint full-gloss acrylic enamel for concrete, masonry, and wood.
- C. Wood Trim:
  - 1. Alkyd-Enamel Finish: Two finish coats over a primer.
    - a. Primer: Exterior wood primer for alkyd enamels.
    - b. Finish Coats: Exterior low-luster alkyd enamel.
- D. Smooth Wood and Siding:
  - 1. Acrylic Finish: Two finish coats over a primer.
    - a. Primer: Exterior acrylic wood primer
    - b. Finish Coats: Exterior low – luster Acrylic.
- E. Stucco Plaster:
  - 1. EIFS Acrylic Finish – see Section 072413

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3.4 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry (Other Than Concrete Unit Masonry):

1. Acrylic Finish: Two finish coats over a primer.
  - a. Primer: Interior concrete and masonry primer.
  - b. Finish Coats: Interior egg shell acrylic paint.

B. Concrete Unit Masonry:

1. Acrylic Finish: Two finish coats over block filler.
  - a. Block Filler: Concrete unit masonry block filler.
  - b. Finish Coats: Interior low-luster acrylic enamel.

C. Gypsum Board:

1. Acrylic Finish: Two finish coats over a primer.
  - a. Primer: Interior gypsum board primer.
  - b. Finish Coats: Interior egg shell acrylic paint.

END OF SECTION 099100

## SECTION 102113 - TOILET COMPARTMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

A. Section Includes:

1. Plastic laminate faced toilet compartments configured as toilet enclosures and urinal screens.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for each exposed product and for each color and texture specified.
- D. Product certificates.
- E. Maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with applicable provisions in Florida Building Code for toilet compartments designated as accessible.

### PART 2 - PRODUCTS

#### 2.1 Plastic Laminate: NEMA LD 3 general purpose, HGA grade .048-inch nominal thickness.

- A. Manufacturer: As indicated.
- B. Toilet-Enclosure Style: Floor anchored units.
- C. Urinal-Screen Style: Wall hung.
- D. Door, Panel, and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores. Seal exposed core material at cutouts to protect core from moisture.
  1. Core Material: Particle board.

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2. Doors and Panels: Finished to not less than 1" thick.
  3. Pilasters: Finished to not less than 1 1/4 inches thick and with internal, nominal .134 inch thick steel-sheet reinforcement.
- E. Pilaster Shoes and Sleeves (Caps): Formed from stainless –steel sheet, not less than 3 inches high, finished to match hardware.
- F. Brackets (Fittings): Manufacturer's standard.
- G. Finish: As indicated.

## 2.2 ACCESSORIES

1. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
2. Hinges: Manufacturer's standard.
3. Recessed latch-operating devices that are accessible to people with disabilities are available. Verify requirements of authorities having jurisdiction.
4. Latch and Keeper: Manufacturer's standard recessed or surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
5. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
6. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
7. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
8. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

## 2.3 FABRICATION

- A. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- B. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

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PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
- B. Clearances: Maximum 1/2 inch between pilasters and panels; 1 inch between panels and walls.
- C. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

## **SECTION 102800 - TOILET AND BATH ACCESSORIES**

### **PART 1 - GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Toilet and bath accessories.
  - 2. Underlavatory guards.
  - 3. Infant-care products.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use room and product designations indicated on Drawings.

#### 1.3 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace mirrors that develop visible silver spoilage defects within 15 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Products: The design for toilet and bath accessories described in Part 2 are based on products indicated. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. Toilet and Bath Accessories:
    - a. American Specialties, Inc.
    - b. Bobrick Washroom Equipment, Inc.
    - c. Bradley Corporation.
  - 2. Underlavatory Guards:
    - a. Brocar Products, Inc.
    - b. Truebro, Inc.
  - 3. Infant-care products:
    - a. Koala Corporation

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- b. American Specialties, Inc.
- c. Safe-Strap Company, Inc.

2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, No. 4 finish (satin), 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, ASTM B 16 (ASTM B 16M), or ASTM B 30 castings.
- C. Steel Sheet: ASTM A 366/A 366M, 0.0359-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, G60 (Z180).
- E. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- F. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- G. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- H. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- I. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.
- J. 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 Provide accessories as indicated or otherwise required.

END OF SECTION 102800

## SECTION 104400 - FIRE-PROTECTION SPECIALTIES

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Portable fire extinguishers.
  - 2. Fire-protection cabinets.

#### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Fire Extinguishers: Include rating and classification.
  - 2. Fire-Protection Cabinets: Include door hardware, cabinet type, trim style, panel style, and details of installation.
- B. Samples: For each exposed cabinet finish.
- C. Maintenance data.

#### 1.3 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
- C. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements of ASTM E 814 for fire-resistance rating of walls where they are installed.

#### 1.4 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Apply decals on field-painted fire-protection cabinets after painting is complete.
- C. Provide quantity of extinguishers and cabinets shown on the Drawings.



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1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of portable fire extinguishers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure of hydrostatic test according to NFPA 10.
    - b. Faulty operation of valves or release levers.
  - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
  - 1. Sheet: ASTM B 209 (ASTM B 209M).
  - 2. Extruded Shapes: ASTM B 221 (ASTM B 221M).
- C. Stainless-Steel Sheet: ASTM A 666, Type 304.
- D. Copper-Alloy Brass Sheet: ASTM B 36/B 36M, alloy UNS No. C26000 (cartridge brass, 70 percent copper).
- E. Copper-Alloy Bronze Sheet: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal, 60 percent copper).
- F. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 6 mm thick.

2.2 PORTABLE FIRE EXTINGUISHERS

- A. Manufacturers:
  - 1. Badger Fire Protection.
  - 2. Kidde Fyrnetics.
  - 3. Larsen's Manufacturing Company.
- B. General: Provide fire extinguishers of type, size, and capacity for each fire-protection cabinet.

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1. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- C. Multipurpose Dry-Chemical Type in Steel Container: UL-rated A:40-B:C, 6-lb nominal capacity, with monoammonium phosphate-based dry chemical.

2.3 FIRE-PROTECTION CABINET

- A. Product by one of the following:
- B. Manufacturers:
  1. Kidde Fyrnetics.
  2. Larsen's Manufacturing Company.
- C. Cabinet Material: Aluminum sheet.
- D. Semi-recessed Cabinet: Cabinet box partially recessed in walls of shallow depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  1. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Aluminum sheet.
- G. Door Style: Center glass 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. Provide manufacturer's standard.
  2. Provide manufacturer's standard hinge permitting door to open 180 degrees.
- J. Accessories:
  1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, with plated or baked-enamel finish.
  2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
  3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
  4. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

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5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
    - 1) Location: Applied to cabinet glazing.
    - 2) Application Process: Decals.
    - 3) Lettering Color: Red.
    - 4) Orientation: Vertical.

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
  - a. Exterior of cabinet, door, and trim, except for those surfaces indicated to receive another finish.
  - b. Interior of cabinet and door.

L. Color: Medium bronze anodized aluminum.

## 2.4 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. Weld joints and grind smooth.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
  2. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semi-recessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging. Remove and replace damaged, defective, or undercharged units.

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- C. Prepare recesses for recessed and semi-recessed fire-protection cabinets as required by type and size of cabinet and trim style.
- D. Install fire-protection specialties in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- E. Fire-Protection Cabinets: Fasten fire-protection cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semi-recessed fire-protection cabinets.
  - 2. Provide inside latch and lock for break-glass panels.
  - 3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- F. Identification: Apply decals at locations indicated.
- G. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair.

END OF SECTION 104400

## **SECTION 220000 – PLUMBING**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION**

- A. The General Provisions of the Contract, including the General Requirements, Supplementary Conditions and Special Conditions, are hereby made a part of this Section as if fully repeated herein.
- B. Scope of Work: Work included under this section of the specifications shall include complete plumbing systems as shown on the drawings and as specified herein.
  - 1. Trench excavation, pumping, backfilling and compaction for underground piping and plumbing.
  - 2. Soil, waste and vent piping.
  - 3. Domestic hot and cold water piping.
  - 4. Fixtures.
  - 5. Water coolers.
  - 6. Water heaters and water heater drain pans.
  - 7. Fittings, hangers, valves, sleeves, escutcheons, etc.
  - 8. Lead flashing.
  - 9. Insulation.
  - 10. Circulating pumps.
  - 11. Controls.
  - 12. Gas piping system.
  - 13. Connections to equipment furnished and installed by others.
  - 14. Disinfection of potable water piping.
- C. Related Work: The following work is specified in other sections of these specifications.
  - 1. Power wiring: Electrical - 260000.
- D. Point of Connection: Underground water and sanitary piping shall commence where shown on the drawings.
- E. Prior to start of any work, the successful Contractor shall meet with the Architect to determine that no questions remain concerning the intent of the drawings or specifications. The Contractor shall bring up for discussion and decision any questions concerning the project. No work shall be performed prior to this meeting. The Architect shall set the date, time, and place of conference.

#### **1.2 CODES, ORDINANCES AND PERMITS**

- A. Comply with all codes applying to the Work of this contract including Florida Building Code 2010, Florida Building Code 2010 - Mechanical, Florida Building Code 2010 – Plumbing and Florida Building Code 2010 - Fuel Gas. Obtain information on all code restrictions and requirements. In case of conflict between the contract documents and a governing code or ordinance, such conflict shall be immediately brought to the attention of the Architect for resolution. Extra payment will not be allowed for Work required by code restrictions except through written agreement with the Owner.
- B. Apply for, obtain, and pay for all required permits and inspection certificates. Final payment is contingent upon delivery of such certificates to the Architect.
- C. Where applicable, all materials and equipment shall bear the Underwriters' Laboratories seal or ASME code stamp. Certificates to this effect shall be furnished to the Architect upon request.

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1.3 SITE INSPECTION

- A. Visit the site and thoroughly inspect conditions affecting the Work before submitting bid. Assume responsibility for meeting all existing conditions including access and workspace limitations.

1.4 DRAWINGS AND SPECIFICATIONS.

- A. Refer to the general construction drawings which are bound with the drawings of this Work for construction details, elevations, etc. Architectural and structural drawings shall take precedence over plumbing drawings. It is the intent of the plumbing drawings to show the general arrangement of the system and not to indicate all offsets, fittings and accessories which may be required, nor to show exact locations of piping, fixtures or equipment except where actual dimensions are given. All vertical piping shall be located in walls in finished spaces unless otherwise noted.
- B. Specifications and drawings shall be considered as supplementary to each other, requiring materials and labor indicated, specified, or implied by either specifications or drawings. It is the intent of the drawings and specifications to call for finished Work, tested, and ready for operation, and in complete conformance with all applicable codes, rules and regulations. Minor details not usually shown nor specified, but manifestly necessary for the proper installation and operation of the various systems, shall be included in the Work and in the bid proposal, the same as if specified or shown on the drawings.
- C. If any departures from the drawings and specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted to the Architect for approval. No departures shall be made without prior approval of the Architect.

1.5 APPROVED MANUFACTURERS

- A. Specific reference in the specifications to any article, device, product, material, fixture or type of construction, etc., by proprietary name, make or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Equal products may be submitted for approval to be used subject to compliance with requirements set forth in the General Requirements, Division 1, and, if applicable, in the Instructions to Bidders.

1.6 MANUFACTURER'S SPECIFICATIONS

- A. Where the name of a concern or manufacturer is mentioned on the drawings or in specifications in reference to his required service or product, and no qualifications or specification of such is included, then the material gauges, details of manufacturer, finish, etc., shall be in accordance with his standard practice, directions or specifications. The Contractor shall be responsible for any infringement of patents, royalties or copyrights which may be incurred thereby.
- B. Equipment scheduled on the drawings was used to arrive at space, maintenance, and utility service. If other equipment is submitted and approved, take responsibility for maintaining these space, maintenance, and utility service requirements and cost for any resulting changes including cost to change electrical service required by substituted equipment.
- C. All materials and equipment shall be new and first class in every respect. As far as is practical, similar products shall be by one manufacturer.

1.7 SUBMITTALS

- A. Submit shop drawings in accordance with the General Requirements, Division 1.

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- B. Samples of any plumbing equipment or materials shall be submitted if requested by the Architect. If a sample is requested, have the sample delivered to the Architect or arrange for the Architect to examine it elsewhere. Failure to comply may be cause for rejection.
- C. Submit shop drawings or catalog data for the Architect's approval before purchasing or installing the following:
  - 1. Piping (where revised from the drawings).
  - 2. Fixtures.
  - 3. Water coolers.
  - 4. Water heaters and water heater drain pans.
  - 5. Valves and appurtenances.
  - 6. Pipe hangers.
  - 7. Insulation.
  - 8. Floor drains and trap primers.
  - 9. Circulating pumps.
  - 10. Controls.
  - 11. Thermostatic mixing valves.

1.8 PERFORMANCE DATA

- A. All performance data specified herein shall be considered actual performance of equipment as installed. Make suitable allowances if installation details are such that actual operating conditions unfavorably affect performance as compared to conditions under which the equipment was rated.

1.9 CATALOG, OPERATION AND MAINTENANCE DATA

- A. Provide four (4) complete sets of a compilation of catalog data of each manufactured item of fixtures and equipment used in the Plumbing Work. In addition to the catalog data, installation, operating and maintenance data and bill of materials for all operating equipment shall be submitted. Each of the four sets of data shall be bound in loose leaf binders and submitted to the Architect before final payment is made. A complete double index shall be provided as follows:
  - 1. Listing the products alphabetically by name.
  - 2. Listing the names of manufacturers alphabetically by name together with their addresses and the names and addresses of local sales representatives.
- B. It is the intent of this catalog, operation and maintenance data to provide the Owner with complete instructions on the proper operation and use, lubrication and periodic maintenance, together with the source of replacement parts and service, for the items of equipment covered.

1.10 CONTRACTOR COORDINATION

- A. The Electrical Contractor shall furnish, set and wire all controls, disconnect devices, and starters as required for all equipment except for those items furnished with integral controls, disconnect devices, and/or starters.
- B. Furnish detailed information to the Electrical Contractor on power wiring requirements for all plumbing equipment actually purchased as soon as practical. This shall include all diagrams and instructions necessary for the Electrical Contractor to make connections properly. If equipment actually purchased requires larger electrical service than equipment scheduled, arrange and pay for required electrical service change.

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- C. Coordinate location of equipment and piping with Electrical and HVAC Contractors to maintain clearance for equipment maintenance, avoid interference with duct and HVAC piping runs, and to prevent piping from being installed over electrical panels. If interference develops, the Architect will decide which equipment, conduit, duct, piping, etc., must be relocated regardless of installation order. Take responsibility for relocating Plumbing work, if so ordered, including all associated costs.
- D. Within 30 days following award of the contract, report to the Architect in writing, all real or potential errors, ambiguities and/or conflicts on the Plumbing Work or between the trades and obtain an agreement with the Architect on a solution. Those reported after 30 days, except as a result of unforeseen circumstances, shall be resolved at the discretion of the Architect. Report conflicts resulting from the progress of Work to the Architect immediately or accept the expense for corrective work caused by failure to report such a conflict. Do not make any changes in design without the written approval of the Architect. Changes in design means any change which will affect the capacity, reliability, operation or safety of the systems or any parts thereof, including changes which may be required to conform to local regulations or codes.

1.11 CONTRACTOR'S WARRANTY

- A. Provide written warranties as specified in the General Requirements, Division 1, and repair any defects becoming apparent within the warranty period as directed by the Architect.

1.12 PROTECTION

- A. Protect all materials and equipment against damage and vandalism during construction. Replace any damaged material or equipment and place the systems in perfect working condition.

**PART 2 - PRODUCTS**

2.1 FIXTURES

- A. Fixtures including faucets, valves, drains, and trim, shall be as scheduled on drawings. Coordinate with interior designer for fixture finishes. All alternate fixture selections must be pre-approved by architect/interior designer prior to bid.

2.2 WATER COOLERS

- A. Water coolers shall be as scheduled on drawings. Coordinate with interior designer for fixture finishes. All alternate fixture selections must be pre-approved by architect/interior designer prior to bid.

2.3 WATER HEATERS AND DRAIN PANS

- A. Water heaters shall be as scheduled on drawings. Approved manufacturers are A.O. Smith, State, Lochinvar, Rheem, Bradford White.
- B. Drain pans for electric water heaters shall be minimum 2" deep with molded and sealed corners and shall be fabricated from 24 gage (0.0236") galvanized steel or high impact plastic with minimum thickness 0.0625".

2.4 PIPE

- A. Soil, waste and vent piping above and below grade shall be Solid Wall DWV polyvinyl chloride (PVC), Schedule 40, solvent weld joints. Exposed sanitary piping under lavatories shall be chrome plated copper/brass.
- B. Cellular Core (Foam Core) piping is not acceptable.



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- C. Hot and cold water supply piping above grade shall be Chlorinated polyvinyl chloride (CPVC), solvent weld joints, suitable for use at minimum working pressure of 160 PSI at 73 deg. F. and 100 PSI at 180 deg. F. Pipes 1/2" thru 2" shall be CPVC-CT (copper pipe size) meeting test requirements of SDR 11. Pipes larger than 2" shall be CPVC Schedule 80 with Schedule 80 fittings. Exposed hot and cold water piping under lavatories, and connections to urinals and water closets shall be chrome plated copper/brass. Piping serving urinals and water closets shall make transition from the water riser(s) located within chases/walls from CPVC to copper.
- D. Cold water supply piping below grade shall be chlorinated polyvinyl chloride (CPVC), solvent weld joints, suitable for use at minimum working pressure of 160 PSI at 73 deg. F. and 100 PSI at 180 deg. F. Pipes 1/2" thru 2" shall be CPVC-CT (copper pipe size) meeting test requirements of SDR 11. Pipes larger than 2" shall be CPVC Schedule 80 with Schedule 80 fittings.
- E. Gas piping above grade shall be schedule 40 black steel with black 150 pound malleable iron screw fittings. Below grade piping outside building shall be schedule 80 black steel protected by approved coal tar shellac with coal tar base wrapping. Below grade piping inside building shall be installed in schedule 40 black steel conduit vented to exterior of building. Conduit shall be protected by approved coal tar shellac with coal tar base wrapping.

2.5 DIELECTRIC UNIONS

- A. Use dielectric unions when joining dissimilar metals.

2.6 FLOOR DRAINS AND TRAP PRIMERS

- A. Floor drains shall be as scheduled on drawings and shall have perforated or slotted strainers, outlets same size as waste pipe to which connected, cast-iron body with inside caulk connection, and deep seal trap. Strainers shall be minimum size required for sanitary pipe size indicated. Provide ductile iron grates for heavy traffic areas. Coordinate with interior designer for fixture finishes. All alternate fixture selections must be pre-approved by architect/interior designer prior to bid.
- B. Trap primers shall be as scheduled on drawings. Pressure drop activated trap primers shall be Mifab model MR-500 with model MI-DU distribution unit (where required).

2.7 INTERIOR HOSE BIBS AND FREEZELESS EXTERIOR WALL HYDRANTS

- A. Freezeless wall hydrant shall have 3/4" hose nozzle, loose operating key, compression type valve seat, vacuum breaker, and box for recessed installation in wall or floor.
- B. Approved manufacturers are Woodford, Prier, J. R. Smith and Zurn.

2.8 SHOCK ABSORBERS

- A. Shock absorbers shall be bellows or piston type water hammer arrestors. Closed end, vertical standpipe air chambers will not be accepted. Water hammer arrestors shall be sized and installed in accordance with PDI standards and the manufacturers specifications. Access shall be provided to water hammer arrestors.

2.9 CLEANOUTS

- A. Floor cleanouts shall be cast-iron with adjustable housing, ferrule with plug, with round secured nickel brass scoriated top for finished concrete floors (including those covered by carpeting) and round secured nickel brass recessed top for vinyl tile floors and carpeted floors. Ductile iron tops for heavy traffic areas. Coordinate with interior designer for fixture finishes. All alternate fixture selections must be pre-approved by architect/interior designer prior to bid.

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- B. Wall cleanouts shall be screw type with chromium plated bronze or stainless steel access cover plates designed to be installed outside wall finish material. Coordinate with interior designer for fixture finishes. All alternate fixture selections must be pre-approved by architect/interior designer prior to bid.

2.10 VALVES

- A. Valves offered under these specifications shall be limited to the products of a type regularly produced for the service and capacities specified. Ratings shall be in accordance with the manufacturer's latest literature available. Valves shall be line size unless specifically shown otherwise. All equipment service valves and all shut-off valves 2" and smaller shall be bronze body full port ball valves with stainless steel ball and reinforced TFE (Teflon) seat.
- B. All shut-off valves 2-1/2" and larger shall be gate valves with flanged ends, Class 125, iron body, bronze mounted, bolted bonnet, rising stem, OS & Y, solid wedge. 2" and smaller shall be either threaded end or solder end, Class 125, bronze body, solid wedge; union bonnet and rising stem for threaded end valve, and screwed bonnet, non-rising stem for solder end valves.
- C. Check valves shall be vertical lift check with bronze disc for vertically mounted valves and swing check, horizontal swing bronze disc with screw cap for horizontally mounted valves.
- D. Throttling valves shall generally be globe pattern, unless otherwise shown on drawings.
- E. Drain valves for all lines shall be 1/2" size, 200 pound, bronze globe valves with threaded ends and hose thread adapter nipple.
- F. Plastic valves are not acceptable.
- G. Approved manufacturers are Apollo, Brass Craft, Capital, Crane, Delany, Delta, Dunham Bush, Jamesbury, Jomar, Milwaukee, Nibco, Sloan, Stockham, T & S, Walworth, Watts, Zurn.

2.11 PIPE HANGERS

- A. Hangers and supports specified by "Type" herein shall be designed and manufactured in accordance with the Manufacturers Standardization Society of Valve and Fittings Industry (MSS) Publication SP-58 and shall be selected and applied in accordance with the Manufacturers Standardization Society of Valve and Fittings Industry (MSS) Publication SP-69.
- B. Pipe hangers shall be galvanized steel hangers selected within the manufacturer's published load ratings and shall be Auto-Grip, Fee and Mason, or Grinnel. Pipe 2-1/2 inches and smaller shall be MSS Type 7, 10. Pipe 3 inches and larger shall be MSS Type 1, 260.
- C. Hanger rods shall be galvanized steel threaded both ends or continuous thread, sized with safety factor of five (5). Approved: Grinnell Fig. 140 or 146. Rods for trapeze hangers supporting several pipes shall be sized for the total piping load.
- D. Hangers for copper pipe shall be either copper-plated type or pipe contact area shall be plastic coated to prevent direct contact between the pipe and hanger.
- E. Supports for insulated pipes shall have insulation shields MSS Type 40.
- F. Beam clamps shall be MSS Type 29.
- G. Inserts:
  - 1. Preset Type: Malleable iron with removable interchangeable nuts having lateral adjustment of not less than one and five-eighths inch. Continuous inserts shall have a capacity of 2000 lb. per foot and

shall be hooked over reinforcing. Approved: C-B Universal Fig. 282; Unistrut Products Co., P-300; Brinkley B32-1.

2. After Set Type: Self-drilling style expansion shells shall be used in concrete and brick. Toggle bolts shall be used on block walls and partitions. Approved: Phillips Drill Co. "Red Head"; Raul "Saber Tooth" and "Spring Wings".
3. Power Actuated After Set Features: Pin and stud anchors shall have a withdrawal resistance four times the indicated load. Approved: Hilti Fastening Systems, Hilti, Inc.; Ramset Fastening Systems, Olin Corp.

- H. Use vibration isolators in hanger rods to isolate vibration in piping subject to vibration, or where shown on drawings.

#### 2.12 SECONDARY PIPE POSITIONING AND SUPPORTS:

1. Makeshift, field devised methods of plumbing pipe support, such as with the use of scrap framing materials, are not allowed. Support and positioning of piping shall be by means of engineered methods that comply with IAPMO PS 42-96. These shall be Hubbard Enterprises/HOLDRITE support systems or Owner-approved equivalent.
2. For plenum applications use pipe supports that meet ASTM E-84 25/50 standards, such as the Hubbard Enterprises/HOLDRITE Flame Fighter™ or Owner-approved equivalent.
3. For vertical mid-span supports of piping 4" and under, use Hubbard Enterprises/HOLDRITE Stout Brackets™ with Hubbard Enterprises/HOLDRITE Stout Clamps or two-hole pipe clamps (MSS Type 26).

#### 2.13 SLEEVES AND ESCUTCHEONS

- A. Sleeves shall be 18 gauge galvanized steel or pre-formed plastic. Sleeves shall be sized to allow approximately 1/8" gap around the pipe or its insulation.
- B. Sleeves through floor slabs or fire walls shall be galvanized steel pipe of proper size. Sleeves through floor slabs shall extend 1/2" above the finished floor.
- C. Sleeves penetrating fire-rated walls, floors or ceilings shall be filled with fire-rated material capable of maintaining the fire-resistance rating of the wall, floor or ceiling.
- D. Escutcheon plates for finished spaces shall be nickel-plated.

#### 2.14 EQUIPMENT, VALVE AND PIPE IDENTIFICATION

- A. All identification legends, arrows and color bands shall be stenciled on pressure-sensitive labeling material approved by the Architect. Labeling material colors for use on piping shall be as specified in ANSI A 13.1 latest revision.
- B. Valve tags shall be plastic, aluminum or brass at least 1" in diameter and stamped with contrasting colored figures as large as possible.
- C. Pipe markers shall be Seton style RPM or approved equal.

#### 2.15 INSULATION

- A. Piping insulation shall be pre-formed, flame-retardant, elastomeric, polyethylene, pipe insulation similar to AP Armaflex, AP Armaflex SS, IMCOA Imolock or NOMACO Nomalock, and installed in accordance

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with manufacturer's instructions. Pre-formed Owens-Corning 3.5 pound density fiberglass pipe insulation with all service jacket and self-sealing lap will be approved for pipe installed in dry locations. Insulation thicknesses shall be as follows:

1. Cold water: 1/2" thick.
  2. Hot water: 1" thick.
  3. All PVC piping located in supply or return air plenums: 1/2" thick. Insulation shall meet all state and local code requirements for plenum use.
  4. All horizontal primary condensate drains within unconditioned areas shall be insulated with 1/2" thick pipe insulation to prevent condensation from forming on the exterior of the drain pipe.
  5. When required by the Local Authority Having Jurisdiction (AHJ), all PVC piping located within ceilings shall be insulated with 1/2" thick pipe insulation. Insulation shall meet all state and local code requirements for plenum use. Contractor shall coordinate requirements with local Building Official prior to bid.
- B. At all exposed piping under handicapped lavatories in rest rooms, provide pre molded vinyl Insulation. Insulation shall be "Handi Lav-guard" insulation kits as manufactured by Truebro Inc. or approved equal. Truebro Inc. phone no. is (203) 875-2868.
- C. All insulation materials and coatings shall meet flame spread and smoke developed ratings per NFPA Bulletin 90-A when tested in accordance with ASTM Standard E 84 and shall meet local requirements for use in return air plenums. Smoke developed less than or equal to 50, and flame spread less than or equal to 25. All coatings and mastics shall be nonflammable in wet state.
- 2.16 LEAD FLASHING
- A. Lead flashing shall be sheet lead weighing 4 pounds per square foot for all pipe flashing through roof.
- 2.17 EQUIPMENT SUPPORTS
- A. Equipment supports shall be sized and designed to support the equipment and shall be hot-dip galvanized steel.
- 2.18 PUMPS
- A. Pump type, capacity and electrical characteristics shall be as indicated on drawings. Approved manufacturers are Bell & Gossett, Grundfos and Taco.
- 2.19 STRAINERS
- A. Strainers shall be self-cleaning and of same size as pipe lines in which they are installed and shall be Webster, Sarco, Dunham, Hoffman, Illinois, or approved equal, Y type with 125 pound iron body, screwed connections to 2" in size and flanged ends for larger sizes.
- B. Screens for water strainers shall be perforated Monel cylinders with 3/64" perforations.
- C. Water strainer 2" and larger shall have a 3/4" valved blow-down connection extended full size to discharge over the nearest accessible floor drain.
- 2.20 MOTORS
- A. Full Load Motor Efficiencies: All motors installed in equipment specified in these specifications shall be classified under the National Electric Manufacturers Association's Standard as "energy efficient" or shall otherwise meet the requirements of the Florida Energy Code.

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- B. Except where otherwise specified, all motors shall be designed for continuous service and for regular starting on full-line voltage with normal starting current. The limits on service factor and temperature rise above 40 deg. C. ambient at rated load shall be as follows:

Motor Enclosure	Service Factor	Temperature Rise
Drip-Proof	115%	40 deg. C.
Totally Enclosed	None	55 deg. C.

- C. The insulation portion of the motor leads between the lug and motor frame shall be at least 5" in length when four or less motor leads are used and at least 8" in length when more than four motor leads are used. When terminal type lugs are supplied, they shall be solderless, Burndy "Hy-Dent" type or approved equal.
- D. Motors shall be furnished for operation as specified or as noted on drawings. All motors shall conform to IEEE, NEMA and ANSI standards and shall be General Electric, Westinghouse, Louis Allis.
- E. Motors furnished for indoor installation shall be of the open, drip-proof design. Motors furnished for installation in wet locations or outdoors shall be of the totally-enclosed design. Motors furnished for installation in hazardous locations shall be of the explosion-proof design.

#### 2.21 ACCESS DOORS

- A. Access doors shall be as similar to those manufactured by Milcor Division of Inland-Ryerson of type as follows:

Door Location	Door Type
Drywall	Style "DW"
Masonry or Tile	Style "M-Stainless"
Acoustical Tile	Style "AT"
Plaster	Style "K"
Fire Rated Walls/Ceilings	Style "Fire Rated"

- B. Each door shall be equipped with two flush, screwdriver operated, cam latches and, other than Style "M", shall be finished to match adjacent surface. Door sizes shall be applicable to access required for normal service.

### PART 3 - EXECUTION

#### 3.1 CUTTING AND PATCHING

- A. Cut and patch existing construction as required for the proper installation of this Work. Cut openings carefully without undue weakening of the structure or damage to the building. Do not cut structural members without permission of the Architect. Provide required bracing, shoring, weather protection, etc. for openings and water stop in concrete floor patches.
- B. Patching shall replace the Work to a condition at least equal to its condition before the cutting was done. Use materials and methods approved by the Architect.
- C. Repainting will not be required under this contract for normal cutting and patching. This does not reduce the responsibility for redecorating of existing Work that is damaged unnecessarily by carelessness.
- D. Cutting and patching includes necessary relocation of existing pipes, conduits, etc. that pass through openings and the proper closing of openings in walls, floors, ceilings, etc. where abandoned mechanical facilities are removed.

### 3.2 INSTALLATION OF THE WORK

- A. Examine the site and all drawings before proceeding with the layout and installation of the Work. Locate all vertical piping within walls in finished spaces unless specifically noted otherwise. Such piping cannot always be shown within walls on drawings due to their small scale.
- B. Arrange the Work essentially as shown, exact layout to be made on the job to suit actual conditions. Confer and cooperate with other trades on the job so all Work will be installed in proper relationship and coordinate precise location of parts with the Work of others.
- C. Arrange for required chases, slots and openings with the General Contractor including locations of required pipe sleeves through walls and foundations. Assume liability for cutting or patching made necessary by failure to make proper arrangements in this respect.
- D. Indicated equipment connections are necessarily based on equipment of a given manufacture. Assume responsibility for proper arrangement of piping, ducts, etc. to connect approved equipment in a proper and approved manner. Follow equipment manufacturer's detailed instructions and recommendations in the installation and connection of all equipment. In case of conflict between manufacturer's instructions and the contract documents, notify the Architect before proceeding. No equipment installation or connections shall be made in a manner that voids the manufacturer's warranty.
- E. Install all Work in a neat and workmanlike manner, using only workmen thoroughly qualified in the trade or duties they are to perform. Rough Work will be rejected.

### 3.3 EXCAVATION, BACKFILLING AND PUMPING

- A. Excavate, back-fill and compact all trenches required for underground plumbing work. Maintain trenches free of water until installation is complete and provide all necessary shoring.
- B. Contractor shall field verify all existing underground utilities and avoid damage to same. Where existing utilities are damaged, the contractor shall be responsible for all repairs or replacement.
- C. Excavate trenches suitable in width to provide a minimum of 6" clear space between the barrel of the pipe and the trench wall on both sides of the pipe. Accurately grade the trench bottom to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length. Take care not to excavate below the depth necessary and excavate bell holes to ensure proper bedding. Backfill over-depths with loose, granular, moist material and thoroughly compact to the depth required.
- D. Place and compact backfill material in 6" layers until the pipe has a minimum cover of 12". Place and compact the remaining material in 12" layers. Grade the surface to a reasonable uniformity and leave the mounding in neat condition as approved by the Architect.
- E. Backfill all trenches passing under foundations with concrete to the underside of the foundation and at a 2:1 slope away from each side of the foundation. Backfill all trenches that are parallel and deeper than foundations with concrete to a point that will place the top of the concrete on a 2:1 slope away from the foundation bottom. Do not backfill trenches until all required tests and inspections are completed.

### 3.4 PIPE INSTALLATION – GENERAL

- A. Install all piping in a workmanlike manner, according to the best practice of the trade, properly pitched and vented to eliminate air pockets or traps, and to ensure rapid and noiseless circulation throughout the entire system. Run all piping parallel with or at right angles to building walls and partitions. Run all vertical piping within walls in finished spaces unless noted otherwise.

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- B. Install all piping so as not to interfere with any electric lighting outlets, ductwork, other piping, or equipment. Do not install piping in front of any door or window and avoid interference with any such openings. Do not install any piping over any motors, transformers, electrical panels, or other electrical equipment.
- C. Cut pipes accurately to measurements established at the building and install without springing or forcing. Cut piping square and remove all burrs and fins before assembling. Use standard fittings for all reductions in size and changes in direction. Mitering of pipe to form elbows or reducers will not be permitted. Thoroughly clean all piping before installation and make sure the piping is free of all foreign material after installation.
- D. Because of the small scale of the drawings, it is not possible to indicate all offsets, fittings and valves. Carefully investigate all conditions affecting the Work to avoid interferences between pipes, ducts, valves, conduits, electrical fixtures and equipment and install as conditions may dictate as part of this contract.
- E. Install all piping in cabinets and vanities as tight to the rear of the cabinet or vanity as possible to provide full utilization of the cabinet or vanity for storage.

### 3.5 PIPE INSTALLATION

- A. Sanitary Piping: Locate and size sanitary piping within the building where not shown on the drawings in accordance with applicable plumbing code. Flash all vents passing through roof with sheet lead flashing extending a minimum of 6" out around base and a minimum of 6" up the stack into a cast-iron flashing collar. Support all soil and vent stacks at the base by means of piers or heavy hangers close to the bottom of the riser and at each floor by means of heavy iron clamps. Pitch all 2 1/2" and smaller drain piping at least 1/4" per foot and 3" and larger drain piping at least 1/8" per foot unless otherwise noted.
- B. Fixtures, Floor Drains and Cleanouts: Provide all fixtures and floor drains with traps to comply with local regulations and as hereinafter specified. Provide exposed traps with brass cleanout plugs. Provide floor drains with trap primers connected as shown on drawings. Provide cleanouts in soil and waste lines as shown on the plans and as required by the governing codes. Extend cleanouts for piping concealed in floor or ceiling construction through the floor above and provide with adjustable floor level cleanout set flush with the finished floor. Use wall cleanouts for piping concealed in wall construction.
- C. Water Supply Piping:
  - 1. Provide a complete system of hot and cold water piping extending from water supply to each fixture and item of equipment requiring water as indicated on drawings.
  - 2. Install all water piping systems in such a manner that systems can be drained or vented completely by providing vents and drain valves at all high and low points.
  - 3. Install valves at take-off from the main and upstream of all equipment connections and elsewhere as indicated on drawings or as required. Provide shock absorbers in accordance with PDI selection standards. Make final connection to the plumbing fixtures as specified with the plumbing fixture. Provide a union in the connection to each threaded valve, fixture or piece of apparatus so that it may be readily removed. Install unions downstream of shut-off valves.
- D. Gas Piping: Provide a complete system of gas piping from the main connection to each outlet as shown on drawings.

### 3.6 PIPE ASSEMBLY

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- A. Sweat Joints in Copper Pipe: Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends, clean soldering surface thoroughly, flux, assemble and solder before surfaces oxidize. Use approved non-corrosive flux and 95-5 lead free solder. Use sufficient heat for complete penetration of solder and wipe away excess flux and solder.
- B. Sewer Pipe: Start laying pipe so that spigot end is pointed in direction of flow. Lay all pipe with ends abutting and true to line and slope. Fit and match all pipe sections to form a sewer with a smooth and uniform invert. Clean sockets before joining pipes and form all joints in accordance with the pipe manufacturer's recommendations.
- C. Lead and Oakum Joints: Caulk with tarred spun oakum and fill with molten lead to a minimum depth of 1" at one pouring, then caulk solidly. Prefabricated joints such as "Dual Tite" or approved equal may be used for underground lines only.
- D. Elastomeric Compression Gasket Joints: Install elastomeric compression gasket joints in accordance with manufacturer's instructions.
- E. Solvent Weld Joints in PVC and CPVC Pipe: Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends, solvent clean joining surfaces thoroughly and form all joints in accordance with the pipe manufacturer's recommendations.
- F. No-Hub Joints: Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends, clean joining surfaces thoroughly and form all joints in accordance with the pipe manufacturer's recommendations.
- G. Threaded Joints in Steel Pipe: Cut pipe to accurate length, ream the ends, and remove burrs. Use clean, sharp dies. Imperfectly formed or torn threads will be rejected. Use approved dope on male threads only and clean away excess dope.

3.7 VALVE INSTALLATION

- A. Install all valves with the stems or spindle above the horizontal where possible and exercise utmost care not to install valves over electrical equipment. Provide extended valve stems on insulated pipe.
- B. Locate valves at all automatic valves, check valves, at all equipment so they can be isolated for repairs, at all branch lines connecting mains, and elsewhere as shown on drawings.
- C. Locate check valves on the discharge side of all pumps and elsewhere as shown on drawings.
- D. After all water circuits are properly balanced and approved, make a slight hacksaw cut across the end of all plug valves to indicate proper operating position of valve.

3.8 PIPE HANGER INSTALLATION

- A. Space hangers for horizontal pipe as follows:

Cast iron soil pipe	5' lengths	5' on center maximum
	10' lengths	10' " " "
Threaded pipe	1/2" to 1-1/4"	6' on center maximum
	1-1/2" to 3"	8' " " "
	4" and larger	10' " " "
Plastic pipe	1/2" to 1"	3' on center maximum
	1-1/4" and larger	4' " " "
Glass pipe	1/2" to 4"	8' on center maximum
	6" and larger	10' " " "



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Copper pipe	1-1/4" and smaller	6' on center maximum
	1-1/2" and larger	10' " " "

- B. Attach hanger rods to sufficiently rigid structural building members. If hangers must be attached to either the top chord or bottom chord of steel bar joist, attach the rods by clamp at the panel points. Do not under any circumstances burn or drill holes in either chord. Do not weld either chord. Provide additional hangers or anchoring devices necessary for proper support of piping at corners, tops of risers, etc. Provide galvanized steel shields over pipe insulation at pipe supports.
- C. Support of pipe tubing and equipment shall be accomplished through means of engineered products specific to each application. Makeshift field devised methods shall not be allowed.

3.9 SLEEVE AND ESCUTCHEON INSTALLATION

- A. Accurately locate and set required sleeves in walls, foundations, floors, etc. Where more than one pipe is necessarily passed through a single sleeve as to a unit piping enclosure or other conditions resulting in larger than 1/8" gap within the sleeve, tightly pack space with proper material to form a barrier against sound, vermin, fire, etc.
- B. Provide escutcheons on all finished surfaces where exposed piping, bare or insulated, pass through floors, walls or ceilings, except in boiler, utility or equipment rooms. Fasten escutcheons securely to pipe or pipe covering.

3.10 FIRE RATED PENETRATIONS

- A. Fill all spaces around piping and spaces between piping and sleeves passing through fire-rated walls, floors, or ceilings with material capable of maintaining the fire-resistance rating of the wall, floor or ceiling. Use Metacaulk 950GW-1 or approved equal caulking material for PVC and CPVC piping.
- B. Recessed fixture penetrations (ie. washer supply boxes, refrigerator supply boxes, etc.) of 1-hour rated firewalls shall be installed such that the required fire resistance will not be reduced. Contractor shall provide and install fire rated assembly washer supply and refrigerator supply boxes for fire rated walls. See architectural drawings for fire rated wall locations and penetration details.

3.11 ACCESS DOORS

- A. Provide access doors at circulation pumps, valves, trap primers, air vents, shock absorbers, and like items requiring adjustment or maintenance accessibility if they cannot be located over lay-in type ceilings or cannot be accessible from attics or mechanical rooms. Obtain approval from Architect for location of access doors. Provide visible markers for access doors in concealed locations.
- B. Provide visible markers on finished side of lay-in type ceilings to indicate locations of valves, air vents, and like items. See Architect for marker type.

3.12 INSULATION

- A. Use application details in accordance with the insulating material supplier's recommendations except where a higher standard is specified herein.
- B. Run covering for piping unbroken through hanger clevises, sleeves, etc. Use details for covering cold surfaces such that continuous covering with unbroken vapor barrier is provided. Use these same covering and hanging details for pipes connecting to vibrating equipment or carrying pulsating pressure to avoid metal-to-metal contact between pipes and hangers.
- C. Provide an insert, not less than 6" long, of the same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2" or larger, to prevent

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insulation from sagging at support points. Use heavy density insulating materials suitable for the specified temperature range and strong enough to prevent crushing.

- D. Cover surfaces of valves, fittings, strainers, and specialties with built-up insulation around irregular shapes to form smooth cylindrical surfaces. Cover such specialties in "cold" systems with special care to maintain continuous vapor barrier. Cover flanges and ground joint unions in "cold" systems.
- E. Insulate all above grade domestic cold and hot water piping including piping run above ceilings, in attics, in crawl space and concealed inside walls.

### 3.13 EQUIPMENT SUPPORTS INSTALLATION

- A. Furnish, fabricate, and erect all structural supports and platforms as required for all equipment installed in this Work, unless otherwise specified. Make these supports and platforms independent of all other equipment supports and suspend them from the building structural steel, roof purlins, inserts imbedded in concrete slabs, or support them on columns as required by the drawings. Attachments to steel bar joists must be approved by the Architect and must only be at panel points. Do not, under any circumstances, burn, drill or weld either chord of steel bar joist.
- B. Prepare and furnish drawing and templates indicating all concrete Work required for equipment furnished under this Work. All concrete required will be provided by the General Contractor. Provide, at the time concrete foundations, bases, or curbs are formed, all necessary anchor bolts as required for the various equipment in this Work. Grout all spaces between the equipment base and concrete supports.

### 3.14 STRAINERS

- A. Locate strainers ahead of each automatic control valve, suction side of each pump and elsewhere as shown on drawings.

### 3.15 CONTROLS

- A. Provide all pressure controls, tempering valves, aquastats, temperature and pressure relief valves and control valves necessary for the operation or adjustment of equipment and not supplied as part of the equipment.
- B. Install all high voltage (120 V or above) control wiring in EMT conduit. Install low voltage control wiring in conduit unless concealed in walls or above finished ceilings. Do not run low voltage control wiring in the same conduit as high voltage control or power wiring.

### 3.16 WATER HEATER DRAIN PAN SYSTEM

- A. Install fiber glass drain pan under water heaters where scheduled and/or detailed on drawings. Install 3/4" drain line from drain pan to building exterior or where shown on drawing.

### 3.17 CONNECTIONS TO EQUIPMENT FURNISHED AND INSTALLED BY OTHERS

- A. Complete all rough-in and final connections to the fireplace equipment furnished and installed by others. See Architectural drawings for details of equipment and location.

### 3.18 EQUIPMENT, VALVE AND PIPE IDENTIFICATION

- A. Securely attach manufacturer's nameplate to all equipment giving data as to design and operating characteristics.
- B. Securely attach nameplates to all switches, control devices and similar items, giving the name and number of the item of equipment to which it is connected.

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- C. Provide direction arrows and color bands every 25 feet where piping is located above lay-in type ceilings and in accessible attic and crawl spaces and within 5 feet of both sides of accessible wall penetrations for the following piping:
  - 1. Domestic hot water piping.
  - 2. Domestic cold water piping.
  - 3. Sanitary drain piping.
  - 4. Plumbing vent piping.
  - 5. Natural gas piping.
- D. Provide small scale drawing showing valve locations and valve number. Provide valve number on each valve tag. Intent of small scale drawing is to show what equipment each valve serves.

### 3.19 TESTS

- A. Testing requirements are minimum and are not intended to be limiting where additional testing methods are required by the authority having jurisdiction.
- B. All drainage, vent and inside conductor piping shall be tested before fixtures are installed by capping or plugging the openings and filling the entire system with water, allowing it to stand thus filled for 24 hours with at least 10 feet of pressure. If required to test system in sections, provide necessary test tees, plugs and stand pipe to test the system with at least 10 feet of pressure. Remake all leaking joints and retest.
- C. Test all water supply piping before fixtures, equipment and/or hydrants are connected. Cap or plug the openings, fill the system with water and apply a hydrostatic pressure of 1.5 times the operating pressure or 125 PSIG, which ever is higher. Hold test pressures for at least 24 hours. Remake all leaking joints and retest.
- D. Test each fixture for soundness, stability of support and satisfactory operation of all its parts.
- E. Gas Piping: Test all gas piping after outlet fittings are connected and entire piping system has been cleaned. Pressurize the system with compressed air to a pressure of 1.5 times the operating pressure or 125 PSIG, which ever is higher. Hold test pressures for at least 2 hours. Remake all leaking joints and retest.

### 3.20 DISINFECTION OF POTABLE WATER PIPING

- A. Disinfect any part of potable water system installed or repaired in accordance with one of the following methods before it is placed in service:
  - 1. After tests are completed, fill all water supply systems with a solution containing 50 PPM of available chlorine and allow to stand for a period of at least 24 hours before being flushed with clean water. Deliver a dated letter certifying sterilization to the Architect.
  - 2. After tests are completed, fill all water supply systems with a solution containing 200 PPM of available chlorine and allow to stand for a period of at least 3 hours before being flushed with clean water. Deliver a dated letter certifying sterilization to the Architect.

### 3.21 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. After final acceptance of all Work and occupancy of building, provide service to make system adjustments to suit conditions created by the occupancy; instruct Owner's operating personnel in operation adjustment and maintenance procedures of system components and acquaint Owner's operating personnel with locations and functions of valves, control devices, etc., in the system.

3.22 CLEANING AND RUBBISH

- A. During the Work, keep the premises clear of rubbish created as a result of the Work. Protect and prevent unnecessary induction of dirt into piping, fixtures and equipment. On completion of the Work, remove all rubbish and debris resulting from the Work and dispose of same. Thoroughly clean and leave in a satisfactory condition for use all equipment, pipe, fixtures, etc.

3.23 RECORD DRAWINGS

- A. The Architect will furnish one set of blue line prints of the drawings as issued for this contract. Use these prints to indicate accurately and neatly any deviation in the actual installation from the drawings as issued. At the completion of the job, deliver the marked-up drawings to the Architect for a permanent record of the exact location of all equipment, pipe runs, etc. as incorporated in the job.

3.24 COMPLETE SYSTEMS

- A. Leave all systems completely operative in all details and in satisfactory working condition, as determined by the Architect. Furnish and install as part of this contract all apparatus and material obviously a part of the systems and necessary for their operation.

**END OF SECTION 220000**

## **SECTION 230000- MECHANICAL**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION OF WORK**

- A. The General Provisions of the Contract, Division 1, including the General Requirements, Supplementary Conditions and Special Conditions, along with the General Requirements, are hereby made a part of this Section as if fully repeated herein.
- B. Scope of Work: The scope of the work included under this section of these specifications shall include complete heating, ventilating and air conditioning systems as shown on the drawings and specified herein. This work shall include:
  - 1. Split-system heat pump and compressor/condenser units.
  - 2. Split system air handling units.
  - 3. Refrigeration piping.
  - 4. Condensate drain piping.
  - 5. Condensate drain pan moisture monitor.
  - 6. Equipment supports, inertia bases, vibration isolators, and identification.
  - 7. Duct work.
  - 8. Insulation.
  - 9. Air distribution equipment.
  - 10. Access doors.
  - 11. Controls and control wiring.
  - 12. Testing, adjusting and balancing.
- C. Related Work Specified Elsewhere:
  - 1. Power wiring: Electrical – 16000.

#### **1.2 CODES, ORDINANCES AND PERMITS**

- A. Comply with all codes applying to the Work of this contract including but not limited to the Florida Energy Efficiency Code, Florida Building Code 2010 and Florida Building Code 2010 - Mechanical. Obtain information on all code restrictions and requirements. In case of conflict between the contract documents and a governing code or ordinance, such conflict shall be immediately brought to the attention of the Architect for resolution. Extra payment will not be allowed for Work required by code restrictions except through written agreement with the Owner.
- B. Apply for, obtain, and pay for all required permits and inspection certificates. Final payment is contingent upon delivery of such certificates to the Architect.
- C. Where applicable, all materials and equipment shall bear the Underwriters' Laboratories seal or ASME code stamp. Certificates to this effect shall be furnished to the Architect upon request.

#### **1.3 INDUSTRY STANDARDS**

- A. Industry Standards: Unless modified by these specifications, the design, manufacture, testing and method of installing all materials, apparatus and equipment shall conform to the following:
  - 1. ASHRAE Standard 90, Energy Conservation in New Building Design.

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2. ANSI B9.1 Safety Code for Mechanical Refrigeration.
3. Standards of National Fire Protection Association.
4. ASHRAE Handbook of Fundamentals.
5. SMACNA Standards for Duct work.
6. Associated Air Balance Council or National Environmental Balancing Bureau Standards for Field Measurement and Instrumentation.
7. Underwriters' Laboratories.
8. National Electrical Code.
9. Air Moving & Conditioning Association.
10. Air Conditioning & Refrigeration Institute.

1.4 SITE INSPECTION

- A. Visit the site and thoroughly inspect conditions affecting the Work before submitting bid. Assume responsibility for meeting all existing conditions including access and work space limitations.

1.5 DRAWINGS AND SPECIFICATIONS.

- A. Refer to the general construction drawings which are bound with the drawings of this Work for construction details, elevations, etc. Architectural and structural drawings shall take precedence over Division 15 drawings (Mechanical Drawings). It is the intent of the Mechanical Drawings to show the general arrangement of the system and not to indicate all offsets, fittings and accessories which may be required, nor to show exact locations of piping, duct work or equipment except where actual dimensions are given. All vertical piping shall be located in walls in finished spaces unless otherwise noted.
- B. Specifications and drawings shall be considered as supplementary to each other, requiring materials and labor indicated, specified, or implied by either specifications or drawings. It is the intent of the drawings and specifications to call for finished Work, tested, and ready for operation, and in complete conformance with all applicable codes, rules and regulations. Minor details not usually shown or specified, but manifestly necessary for the proper installation and operation of the various systems, shall be included in the Work and in the proposal, the same as if specified or shown on the drawings.
- C. If any departures from the drawings and specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted to the Architect for approval. No departures shall be made without prior approval of the Architect.
- D. Specific reference in the specifications to any article, device, product, material, fixture or type of construction, etc., by proprietary name, make or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Substitutes may be used subject to compliance with requirements set forth in the General Requirements, Division 1, and as approved by the Architect.
- E. Submit cost implications to contract in bid when providing substitutes for specified equipment and for all alternatives requested in the construction documents.

1.6 MANUFACTURER'S SPECIFICATIONS

- A. Where the name of a concern or manufacturer is mentioned on the Drawings or in Specifications in reference to his required service or product, and no qualifications or specification of such is included, then the material gauges, details of manufacturer, finish, etc., shall be in accordance with his standard practice, directions or specifications. The Contractor shall be responsible for any infringement of patents, royalties, or copyrights which may be incurred thereby.

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- B. Equipment scheduled on drawings was used to arrive at space, maintenance access, utility service and equipment supports. If other equipment is submitted and approved, take responsibility for maintaining these space, maintenance access, utility service requirements and any revisions required for installation such as equipment supports, roof curbs and access ladders. Take responsibility for the coordination and cost for any resulting changes including cost to change electrical service required by substituted equipment.
- C. All materials and equipment shall be new and first class in every respect. As far as is practical, similar products shall be by one manufacturer. Equipment designed to operate as a system such as outdoor condenser or heat pump units with indoor air handling units shall be from one manufacturer unless scheduled otherwise.

#### 1.7 SUBMITTALS

- A. Submit shop drawings in accordance with the General Requirements, Division 1.
- B. Samples of insulation, diffusers, dampers or any other mechanical equipment or materials shall be submitted if requested by the Architect. If a sample is requested, have the sample delivered to the Architect or arrange for the Architect to examine it elsewhere. Failure to comply may be cause for rejection.
- C. Submit shop drawings or catalog data for the Architect's approval before purchasing or installing the following:
  - 1. Split-system compressor/condenser and heat pump units.
  - 2. Air handling units.
  - 3. Grilles, diffusers and registers.
  - 4. Exhaust and supply fans.
  - 5. Insulation.
  - 6. Controls and wiring diagrams.
- D. Submit detailed and dimension plan showing all pipe sleeves and duct openings required in building structure including floors and roof deck.

#### 1.8 PERFORMANCE DATA

- A. All performance data specified herein shall be considered actual performance of equipment as installed. Make suitable allowances if installation details are such that actual operating conditions unfavorably affect performance as compared to conditions under which the equipment was rated.

#### 1.9 CATALOG, OPERATION AND MAINTENANCE DATA

- A. Provide four (4) complete sets of a compilation of catalog data of each manufactured item of equipment used in the Mechanical Work. In addition to the catalog data, installation, operating and maintenance data and bill of materials for all operating equipment shall be submitted. Each of the four sets of data shall be bound in loose leaf binders and submitted to the Architect before final payment is made. A complete double index shall be provided as follows:
  - 1. Listing the products alphabetically by name.
  - 2. Listing the names of manufacturers alphabetically by name together with their addresses and the names and addresses of local sales representatives.

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- B. It is the intent of this catalog, operation and maintenance data to provide the Owner with complete instructions on the proper operation and use, lubrication and periodic maintenance, together with the source of replacement parts and service, for the items of equipment covered.

1.10 CONTRACTOR COORDINATION

- A. The Electrical Contractor will furnish, set and wire all disconnect devices and starters as required for all equipment except for those items furnished with integral disconnect devices and/or starters.
- B. Furnish detailed information to the Electrical Contractor on power wiring requirements for all mechanical equipment actually purchased as soon as practical. This shall include all diagrams and instructions necessary for the Electrical Contractor to make connections properly. If equipment actually purchased requires larger electrical service than equipment scheduled, arrange and pay for required electrical service change.
- C. Provide all air conditioning control devices.
- D. Coordinate location of equipment, piping, and duct work with Electrical Contractor, Fire Protection Contractor, and Plumbing Contractor to maintain clearance for equipment maintenance, prevent interference with duct and piping runs, and to prevent ducts and piping from being installed over electrical panels. If interference develops, the Architect will decide which equipment, conduit, duct, piping, etc., must be relocated regardless of installation order. Take responsibility for relocating Mechanical work, if so ordered, including all associated costs.
- E. Within 30 days following award of the contract, report to the Architect in writing, all real or potential errors, ambiguities and/or conflicts on the Mechanical Work or between the trades and obtain an agreement with the Architect on a solution. Those reported after 30 days, except as a result of unforeseen circumstances, shall be resolved at the discretion of the Architect. Report conflicts resulting from the progress of Work to the Architect immediately or accept the expense for corrective work caused by failure to report such a conflict.

1.11 CHANGES

- A. Do not make any changes in design without the written approval of the Architect. Changes in design means any change which will affect the capacity, reliability, operation or safety of the systems or any parts thereof, including changes which may be required to conform to local regulations or codes.

1.12 MECHANICAL CONTRACTOR'S WARRANTY

- A. Provide written warranties as specified in the General Requirements, Division 1, and provide a five year warranty for all refrigeration compressors against defects in materials and workmanship. Repair any defects becoming apparent within the warranty period as directed by the Architect.

1.13 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Provide complete protection against weather, rain, windstorms, frost, ice, heat, and acts of vandalism, so as to maintain all materials and equipment free from injury or damage, including physical damage of any nature. At end of each workday, cover work as required to provide such protection. This shall include but not be limited to erection of all temporary shelters to protect adequately any materials and equipment stored on site, cribbing of any materials and equipment above the floor of the construction, and the covering of materials and equipment in the building under construction with protective covering.
- B. Provide dry storage facilities for materials and equipment; including but not limited to duct work, insulation, air handling units, controls, motor operated equipment, etc.; sensitive to damage by



moisture. Outside, unprotected storage will not be accepted. Storage inside building being constructed will not be accepted until roof and walls are weather tight unless temporary protection is provided.

- C. Failure to comply shall be sufficient cause for rejection of damaged materials and equipment. Replace any damaged material or equipment and place the systems in perfect working condition.

## **PART 2 – PRODUCTS**

### **2.1 SPLIT SYSTEM HEAT PUMPS UNITS - 2 SPEED**

- A. Capacity shall be as scheduled on the drawings and adjusted for line losses of refrigerant piping. Capacity shall be combined rating at actual conditions entering the evaporator and 95 degrees F outdoor ambient temperature.
- B. Unit shall have all operating components assembled on one common base. These shall include: compressor, condenser coil, condenser fan and motor, charging valves, all controls, and a holding charge of refrigerant. Units shall be designed for outdoor installation with all exterior surfaces factory painted with primer and enamel for weather protection. Drain holes shall be provided for elimination of rain. Provide removable panels for access to components.
- C. Condenser coil shall be of the continuous aluminum plate fin and copper tube type and shall be circuited for integral sub-cooler. The coil shall be tested with refrigerant and sealed with a holding charge of refrigerant.
- D. Compressor shall be 2 speed and shall be mounted on vibration isolators.
- E. Refrigeration circuit components shall include liquid line service valve, suction line service valve, and full charge of compressor oil and holding charge of refrigerant.
- F. Controls shall be mounted in separate panel on the side of the unit for installation and service access. Units shall be provided with controls specified on the drawings and all standard controls including the following even if not considered standard:
  - 1. Single point power connection.
  - 2. Compressor and fan contactors.
  - 3. Motor overload protection for ungrounded legs.
  - 4. High pressure cut-out.
  - 5. Auto reset low-pressure switch to stop compressor if refrigerant pressure drops below 7 psig.
  - 6. Compressor anti-cycling relays set between 3 and 5 minutes.
  - 7. Low-ambient controller down to 30° F. for winter operation.
  - 8. Evaporator freeze thermostat to stop unit operation if evaporator reaches freeze-up conditions.
  - 9. Indoor time delay relay to continue indoor blower motor after compressor cycles off.
  - 10. Adjustable outdoor thermostat to prevent supplemental electric heat from operating except during defrost mode or when outside air temperature is below set-point (40 F).
  - 11. Service alarm to signal compressor not operating during heating mode with indicating light on indoor thermostat.
  - 12. Low voltage and phase loss protective controls for all three phase motors.
- G. Approved Manufacturers: Carrier, Lennox, Trane or pre-approved equal.

### **2.2 AIR HANDLING UNITS - VARIABLE SPEED**

- A. Air handling units shall be draw through type with 1" thick, standard size, disposable type filters and shall have DX cooling coils and electric heating coils as scheduled on drawings with minimum unit capacities as indicated.

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- B. Fan capacities shall be as scheduled on drawings. Fans shall be direct drive with variable speed motors. Fans and motors shall be mounted on vibration isolators.
- C. Casing shall be constructed of heavy duty, factory painted, galvanized sheet steel adequately reinforced with structural members. Units shall include plastic drain pan, with at least 1" thick insulation, extending under coil and fan sections with brass drain connection. Removable panels in front of unit shall provide access to all internal parts. Units shall have filter access panel and filter rack. All unit panels shall be internally insulated to meet requirements of the Florida Energy Code. All insulating materials shall meet the requirements of NFPA 90-A. Units shall be equipped with duct collars on intake and discharge of unit and single point power connection.
- D. Direct expansion cooling coils shall be of the continuous aluminum plate fin and copper tube type and shall have an equalizing type distributor. The coil shall be tested with refrigerant and sealed with a holding charge of nitrogen at 10 PSIG.
- E. Electric heating coil shall be factory installed and protected with air flow switch. Heaters over 10 KW shall have heating elements sequenced on and off in at least two stages and shall be wired for multiple stage operation. All heaters shall be equipped with manual reset thermal overload device, current overload for heaters above 10 KW and required heating and cooling system controls including 60 va control circuit (24 v) transformer. Low-voltage connections shall be point-to-point on terminal board.
- F. Unit controls shall include but not be limited to solid-state interlock control board, control transformer, and evaporator freeze thermostat. Wall mounted humidistat and thermostat shall control fan speed. Provide EDA humiditrol option.
- G. Approved Manufacturers: Carrier, Lennox, Trane or pre-approved equal.

2.3 EXHAUST FANS

- A. Fans shall be of size, type and capacity indicated on the drawings. Power supply shall be as scheduled. The complete units shall be approved by the Underwriters' Laboratories and be in full accordance with all provisions of the National Electric Code.
- B. Provide fan with internal integral thermal protector and unit mounted disconnect.
- C. Pre-wired, factory mounted speed controller for direct drive units.
- D. Approved Manufacturers: Acme, Aerovent, American Coolair, Greenheck, Hartzell, Loren Cook, Penn Ventilator, Swartwout, Twin City.

2.4 REFRIGERANT PIPING AND ACCESSORIES

- A. Piping shall be type "L" hard drawn copper with wrought copper, refrigerant grade fittings. All elbows shall be long radius.
- B. Moisture indicator shall be installed in the liquid line just before the refrigerant solenoid valve. Thermostatic expansion valves shall be provided for each evaporator circuit. Valves shall be equipped with external equalizer.

2.5 CONDENSATE DRAIN PIPING

- A. Condensate piping located inside building below ceilings shall be non-insulated schedule 40 polyvinyl chloride (PVC). Condensate piping located above ceilings shall be insulated schedule 40 polyvinyl (PVC). Non-insulated piping located above ceilings, whether used for return or supply air plenums or not, will not be allowed.

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- B. Condensate drain trap float switch shall be "EZ-TRAP" model EZT-225 or approved equal. (EZ TRAP 3 Kellogg Court, Unit 10, Edison, NJ 08817 phone 732-248-8066).

2.6 PIPE HANGERS

- A. Pipe hangers for refrigerant and condensate piping located inside building shall be non-metallic strap hangers designed to rigidly support piping without damage to pipe insulation.
- B. Pipe hangers shall be Auto-Grip, Fee and Mason, Grinnel, steel clevis hangers, roller or fixed as shown on drawings, selected within the manufacturer's published load ratings.
- C. Hanger rods shall be at least:

Pipe to 2"	3/8" diameter
2-1/2" to 3"	1/2" diameter
4" to 5"	5/8" diameter
6"	3/4" diameter
8" and larger	7/8" diameter
- D. Rods for trapeze hangers supporting several pipes shall be sized for the equipment load.
- E. Hangers for copper pipe shall be either copper-plated type or there shall be a shield of 4 pounds sheet lead to completely surround the pipe to prevent direct contact with the hanger.
- F. Supports for pipes with vapor barrier type covering shall not contact the pipe but shall surround the unbroken covering. Provide galvanized steel shields with mitered corners properly formed to the jacket outside diameter between hanger clevises and the lower 1/3 of the circumference. Size shields as follows:

Pipe up to 1"	18 gauge x 8" long
1-1/4" to 2"	16 gauge x 12" long
2-1/2" to 4"	14 gauge x 16" long
5" and larger	12 gauge x 20" long
- G. Use vibration isolators in hanger rods to isolate vibration in piping subject to vibration, or where shown on drawings.

2.7 SLEEVES AND ESCUTCHEONS

- A. Sleeves shall be 18 gauge galvanized steel or pre-formed plastic. Sleeves shall be sized to allow approximately 1/8" gap around the pipe or its insulation.
- B. Sleeves through floors or fire walls shall be galvanized steel pipe of proper size. Sleeves through floors shall extend 1/2" above the finished floor. Sleeves penetrating fire-rated walls, floors or ceilings shall be filled with fire-rated material capable of maintaining the fire-resistance rating of the wall, floor or ceiling.
- C. Escutcheon plates for finished spaces shall be nickel-plated.

2.8 EQUIPMENT SUPPORTS, VIBRATION ISOLATORS, AND IDENTIFICATION

- A. Equipment supports shall be sized and designed to support the equipment and shall be fabricated from galvanized steel.
- B. Supports for vertical air handling units up thru 2,000 cfm shall be fabricated from galvanized steel angles designed to support the unit. Angles shall be at least 1-1/2" x 1-1/2" x 1/4" thick. Supports shall be designed to allow clearance for return air ducts or plenum.

## 2.9 MOTORS

- A. Full Load Motor Efficiencies: All motors installed in equipment specified in these specifications shall be classified under the National Electric Manufacturers Association's Standard as "Energy Efficient" or shall otherwise meet the requirements of the Florida Energy Code.
- B. Except where otherwise specified, all motors shall be designed for continuous service and for regular starting on full-line voltage with normal starting current. The limits on service factor and temperature rise above 40° C. ambient at rated load shall be as follows:

Motor Enclosure	Service Factor	Temperature Rise
Drip-Proof	115%	40° C.
Totally Enclosed	None	55° C.

- C. The insulation portion of the motor leads between the lug and motor frame shall be at least 5" in length when four or less motor leads are used and at least 8" in length when more than four motor leads are used. When terminal type lugs are supplied, they shall be solderless, Burndy "Hy-Dent" type or approved equal.
- D. Motors shall be furnished for operation as specified or as noted on the drawings. All motors shall conform to IEEE, NEMA and ANSI standards.
- E. Motors furnished for indoor installation shall be of the open, drip-proof design. Motors furnished for installation in wet locations or outdoors shall be of the totally-enclosed design. Motors furnished for installation in hazardous locations shall be of the explosion-proof design.

## 2.10 DUCT WORK

- A. Supply air, return air, outside air, transfer air, and exhaust air, and return air plenums under vertical air handling units shall be galvanized sheet metal.
- B. Supply air duct work designated as single wall spiral shall be round spiral lock-seam with matching fittings. Duct and fittings shall be made from galvanized steel per ASTM A-527. Zinc coating shall be G-60 or higher. Elbows shall have center-line radius of 1.5 times the diameter. Fitting seams shall be of tack welded or punch lock construction and sealed with high pressure duct sealant as required by SMACNA.
- C. Fabricate sheet metal duct work in accordance with latest edition of "HVAC Duct Construction Standards - Metal and Flexible" as published by SMACNA and to meet construction requirements for 1" W.G. minimum static pressure and seal class "C".
- D. Fabricate and seal duct joints and connections such that air leakage does not exceed five (5) percent of design air volume.
- E. Return air duct work except return air plenum under vertical air handling units, shall be fiberglass duct system equal to Manville's Micro-Aire M/F Type 800 with HDF facing or Owens Corning's EnDuraGold Duct System Type 475 (1" thick) and Type 800 (1-1/2" thick). Return air ducts located on air conditioned side of building insulation shall be 1" thick and return air ducts located outside building insulation shall be 1-1/2" thick (see notes on drawing). Duct system air stream side shall be faced with non-abrasive, fire-resistant coating to minimize air flow resistance and prevent microbial growth per ASTM G21 and G22.
- F. Transfer air duct work shall be 1" thick fiberglass duct system equal to Manville's Micro-Aire M/F Type 800 with HDF facing or Owens Corning's EnDuraGold Duct System Type 475. Duct system air stream side

shall be faced with non-abrasive, fire-resistant coating to minimize air flow resistance and prevent microbial growth per ASTM G21 and G22.

- G. Duct dimensions shown on drawings are finished inside dimensions. Increase duct sizes to allow for double wall construction, acoustic duct liner or fiberglass duct system wall thickness where applicable.
- H. Changes in direction, including Tees, in square and rectangular duct work for both supply air, outside air, and return air shall be made with mitered elbows fitted with closely spaced full radius air foil type turning vanes constructed for maintaining constant velocity through elbow. Changes in direction in supply and return ducts may be made with radius elbows instead of mitered elbows and turning vanes if space limitations permit or if shown on drawings. Radius elbows in round duct work do not require turning vanes for either supply or return air.

#### 2.11 FIBROUS GLASS DUCT SYSTEM OPTION

- A. Supply, return, and outside air duct work may be fibrous glass duct system equal to Manville's Micro-Aire M/F Type 800 with HDF facing or Owens Corning EnDuraGold Fiberglass duct board Type 475 (1") and Type 800 (1-1/2"). Ducts shall not exceed 84" in either width or height and nor exceed 2,000 fpm and 2" of water pressure. Maximum K value shall be 0.23 (BTU-in/hr-sf-deg. F). Fibrous glass duct system shall be 1-1/2" thick when located in areas within the building but on the non-air conditioned side of the building insulation and 1" thick when located on the air conditioned side of the building insulation unless otherwise noted on the drawings. Air stream side of duct shall be faced with nonabrasive, fire-resistant coating to minimize air flow resistance and prevent microbial growth per ASTM G21 and G22. Fibrous glass system ducts will not be permitted for use outside of building.

#### 2.12 A/C DUCT WORK ACCESSORIES

- A. Manual balance/volume dampers shall be opposed blade type and shall be 16 gauge minimum galvanized steel with zinc-plated hardware and bronze or nylon bearings. Blades shall not be over 8" wide nor less than 16 gage galvanized steel. Maximum leakage shall be less than 1% at static pressure of 4" W.G. Provide locking quadrant damper operators on manual dampers.
- B. Provide 24 V electric operators on automatic dampers. Electric operators shall be oil immersed gear train type with spring return and shall function proportionally or pulsed directly for position control and shall be compatible with DDC system.
- C. Turning vanes shall be factory fabricated full radius double thickness air foil type with 24 gauge rails and hollow vanes.
- D. Extractors at branch take-offs shall be adjustable push rod type with locking hardware. Extractors at sidewall supply grilles shall be adjustable by removing the grille face.
- E. Splitters shall be constructed of at least the same gauge galvanized steel as the duct wherein they are used and shall not be less than 24 gauge. Blades shall be formed in two thickness of metal to provide rounded nose to air flow.
- F. Access doors shall be factory fabricated, double wall insulated type of 24 gauge minimum galvanized steel. Doors shall be non-hinged, completely removable with hand operated adjustable tension catches and shall be completely gasketed around their perimeter. Doors shall be as large as the duct size will permit (within 1" of each duct edge) and large enough to permit access to fire dampers and other items requiring access. Doors larger than 12" shall have latches on all four sides.
- G. Flexible connectors shall meet requirements of UL 191 for Class 1 connectors.

#### 2.13 FLEXIBLE DUCT

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- A. Flexible duct shall be pre-insulated type, listed by Underwriters' Laboratories, Inc., Class 1 ducts, polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; aluminized vapor-barrier film and shall conform to NFPA Bulletin 90-A.
- B. Duct shall be designed for pressure rating of 4-inch W.G. positive and 0.5-inch W.G. negative. Maximum air velocity shall be 4000 fpm.
- C. Insulation shall be the required thickness and material to provide a minimum thermal resistance "R" of 6.0 when located outside of the building thermal envelop and "R" of 4.2 when located inside the building thermal envelope. Comply with ASHRAE/IESNA 90.1-2004.
- D. Flexible duct connectors shall be stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action.

2.14 INSULATION – GENERAL

- A. All insulation materials and coatings shall meet flame spread and smoke developed ratings per NFPA Bulletin 90-A when tested in accordance with ASTM Standard E-84. Smoke developed less than or equal to 50, and flame spread less than or equal to 25. All coatings and mastics shall be nonflammable in wet state.
- B. Approved Manufacturers: Armstrong World Industries, CertainTeed Corp., Manville, IMCOA, NOMACO, Owens-Corning Fiberglas Corp., Pittsburg Corning Corp.

2.15 DUCT WORK INSULATION

- A. General: Duct insulation shall be the required thickness and material to provide a minimum thermal resistance "R" of 8 when duct is located outside building, "R" of 6.0 when duct is located in areas within the building but on the non-air conditioned side of the building insulation and 4.2 when located on the air conditioned side of the building insulation unless otherwise noted on the drawings. These R values are "as-installed" minimums. Insulation nominal thickness shall not exceed 2".
- B. Flexible external insulation shall be fiberglass and shall have an "as-packaged" R value not less than 25% greater than the required "as-installed" value and shall have a duplex laminated, reinforced aluminum foil vapor barrier.
- C. Semi-rigid external insulation shall be fiberglass and shall have an "as-packaged" R value not less than the required "as-installed" value and shall have all service jacket (ASJ) facing.
- D. Acoustical duct liner shall be fiberglass insulation with air stream side faced with nonabrasive, fire-resistant coating to minimize air flow resistance and prevent microbial growth per ASTM G21 and G22. Maximum K factor shall be  $0.23 \text{ (BTU x inch) / (sq. ft. x } \text{° F. x hr)}$ . Thickness shall be determined by required "R" value depending on duct location. Minimum of 1" thick duct liner with additional external insulation sufficient to provide required "R" value may be use. ToughGard Duct Liner as manufactured by CertainTeed or approved equal.
- E. Extruded polystyrene insulation shall have following properties:
  - 1. Density: 1.35 P.C.F minimum.
  - 2. Resistance at 75° F:  $5.0 \text{ (HR x SF x } \text{° F.) / (BTU x inch)}$  minimum.\Water Vapor: 1.1 perm-in maximum.
  - 3. Water absorption: 0.3 % by volume maximum.
- F. Aluminum Jacketing: 0.016" thick minimum with bands and seals of same material by Premetco International or approved equal.

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G. Vapor Barrier Jacket:

1. ASTM C921, White kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
2. Moisture Vapor Transmission: ASTM E96; 0.02 perm inches.
3. Secure with self sealing longitudinal laps and butt strips.
4. Secure with outward clinch expanding staples and vapor barrier mastic.

2.16 REFRIGERANT SUCTION PIPING INSULATION

- A. Above grade piping inside building and when installed in PVC conduit: 1/2" thick, pre-formed, flame-retardant, elastomeric, polyethylene, pipe insulation similar to IMCOA Imolock or NOMACO Nomalock, and installed in accordance with manufacturer's instructions.
- B. Exposed piping outside building : 3/4" thick, pre-formed, flame-retardant, elastomeric, polyethylene, pipe insulation similar to IMCOA Imolock or NOMACO Nomalock, and installed in accordance with manufacturer's instructions and, in addition, provide banded aluminum jackets to floor or wall penetration. Install and secure aluminum jackets in accordance with manufacturer's instructions.

2.17 CONDENSATE DRAIN PIPING INSULATION

- A. Primary condensate copper piping, if used instead of schedule 40 PVC, shall be insulated with 1/2", pre-formed, flame-retardant, elastomeric, polyethylene, pipe insulation similar to IMCOA Imolock and Armstrong Armaflex, or, in dry locations, 1/2" thick 3.5 pound density molded fiberglass with all-purpose, high density, white kraft bonded to aluminum foil, reinforced with fiberglass yarn jacket. Insulation located in supply or return air plenums shall meet all state and local code requirements for plenum use. Install pipe insulation in accordance with manufacturer's instructions.
- B. Copper or PVC used for primary or secondary condensate piping located inside building above ceilings shall be insulated with 1/2", pre-formed, flame-retardant, elastomeric, polyethylene, pipe insulation similar to IMCOA Imolock and Armstrong Armaflex, or, in dry locations, 1/2" thick 3.5 pound density molded fiberglass with all-purpose, high density, white kraft bonded to aluminum foil, reinforced with fiberglass yarn jacket. Install pipe insulation in accordance with manufacturer's instructions.

2.18 PIPE INSULATION JACKETING, BANDING, AND TAPING

- A. All service jacketing: Kraft Paper aluminum foil/vinyl coating fire retardant construction by Lamtec Corp., Alpha Associates, or approved equal.
- B. Aluminum jacketing: 0.016" thick minimum with 1/2" wide bands and seals of same material by Premetco International or approved equal.
- C. PVC jacketing: 0.03" thick minimum with self sealing laps and heavy duty fitting covers of matching thickness by Proto Corp or approved equal. All PVC shall have flame and smoke rating of 25/50 or less and be UV resistant.
- D. PITTCOTE® 404 coating and PC® fabric 79 reinforcing by Pittsburgh Corning. No alternatives accepted.
- E. Fiber reinforced tape 3/4" wide Scotch Brand #8934 by 3M or approved equal.

2.19 EQUIPMENT INSULATION

- A. Equipment insulation shall be fiberglass flexible external insulation having a duplex laminated, reinforced aluminum foil vapor barrier. Maximum K factor shall be 0.31 (BTU x inch) / (sq. ft. x ° F. x hr). Thickness shall be as follows: (specify equipment to be insulated & thickness).

2.20 AIR DISTRIBUTION EQUIPMENT

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- A. Air distribution devices shall be as scheduled on the drawings. All supply diffusers shall be selected to deliver the indicated volume of supply air without exceeding the available throw and with an NC rating not to exceed 25, including half open damper. Submittal data shall clearly indicate performance of selected devices including air quantity, pattern, throw, pressure drop, sound level, finish, dimensions and construction of all air distribution devices.
- B. Refer to Architectural reflected ceiling plans for exact location of air distribution devices. All supply, return and exhaust diffusers, grilles and registers shall be steel construction unless scheduled otherwise and shall have baked enamel finish with color selected by the Architect. In lieu of aluminized steel, steel grills and diffusers with thermoset Alkyd-Melamine painting system applied by an electro-deposition system that totally submerges the entire product in the paint followed by a baking process at 315° F., similar to process used by Titus, will be accepted. This optional material and paint system shall pass ASTM D-1654, 300 hour Corrosive Environments Salt Spray Test, ASTM D 870, 500 hour Water Immersion Test, and ASTM D-2794 Reverse Impact Cracking Test without creepage, blistering, or deterioration of paint surface.
- C. Ceiling surface and sidewall supply registers shall, unless otherwise scheduled, have opposed blade type key operated dampers with a detachable key. One (1) key shall be furnished for each register.
- D. Approved Manufacturers: Acutherm, Anemostat, Krueger, Metalaire, Metal Industries, Nailor, Price, Seiho, Titus, Tuttle & Bailey.

2.21 OUTSIDE AIR INTAKE AND EXHAUST AIR LOUVERS

- A. Wall louvers shall be drainable type with drain gutter in each blade and down-spouts in frame jambs and mullions. Frame and blade material to be anodized extruded aluminum construction, anodize color to be selected by the Architect. Frame shall contain integral caulking slots. Insect screen shall be installed on building side of louver. Insect screens on air intake louvers shall be made accessible from the building side of louver through access doors in duct work or from the outside through removable louver frame.
- B. Frame and blade material for louvers in soffit to be anodized extruded aluminum construction, anodize color to be selected by the Architect. Insect screen shall be installed on building side of louver. Insect screens on air intake louvers shall be accessible from the outside through a removable louver frame.
- C. Design shall incorporate structural supports required to withstand minimum wind load of 110 mph. Louver size shall be as scheduled on drawing.
- D. Published performance data must be submitted for approval prior to fabrication and must demonstrate pressure drop and water penetration equal to or less than unit scheduled on drawings.
- E. Approved Manufacturers: Arrow, Empco, Ruskin, United Air.

2.22 CONTROLS

- A. Room temperature thermostats shall be programmable type designed for cooling and electric heating applications as applicable. Unit shall have automatic heating/cooling changeover with system light; digital display indicating time of day, day of week, room temperature, current program operating mode, and current active stage; 3 hour timed override; two occupied and two unoccupied programs per day; keyboard disable to prevent tampering; 7-day program basis; status indicating lights displayed in digital display; constant fan operation during occupied mode; auto fan operation during setback (set applicable dip switch or program mode); integral temperature sensor. "Auto" fan mode shall allow supply fan to run only when cooling or heating is required by the room thermostat.



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- B. Time clock shall be electronic type with 365-day programming including 32 holidays, daylight savings and leap year adjustment, four (4) independent channels, each with daily programming capability repeat programming feature to allow specific daily program to be repeated for other days, manual and timed program override, 4 month battery back-up to protect program and time, normal line protection for electronic circuitry, and NEMA 1 steel housing with display window. Intermatic, Paragon, or approved equal.
- C. Furnish all controls to provide for proper performance of equipment as specified in "CONTROLS - SEQUENCE OF OPERATION" in PART 3 of these specifications.
- D. Smoke detectors will be supplied by Fire Alarm Subcontractor.
- E. Control wiring conduit shall be EMT. All control wiring run in plenum containing supply or return air shall be installed in conduit or be plenum rated wire.

2.23 ACCESS DOORS

- A. Access doors shall be as similar to those manufactured by Milcor Division of Inland-Ryerson of type as follows:

Door Location	Door Type
Drywall	Style "DW"
Masonry or Tile	Style "M-Stainless"
Acoustical Tile	Style "AT"
Plaster	Style "K"
Fire Rated Walls/Ceilings	Style "Fire Rated"

- B. Each door shall be equipped with two flush, screwdriver operated, cam latches and, other than Style "M", shall be finished to match adjacent surface. Door sizes shall be applicable to access required for normal service.

**PART 3 – EXECUTION**

3.1 INSTALLATION OF THE WORK

- A. Examine the site and all drawings before proceeding with the layout and installation of the Work.
- B. Arrange the Work essentially as shown, exact layout to be made on the job to suit actual conditions. Confer and cooperate with other trades on the job so all Work will be installed in proper relationship and coordinate precise location of parts with the Work of others.
- C. Arrange for required chases, slots and openings with the General Contractor including locations of required pipe sleeves through walls and foundations. Assume liability for cutting or patching made necessary by failure to make proper arrangements in this respect. Provide detailed and dimension plan showing all pipe sleeves and duct openings required in building structure including floors and roof deck.
- D. Indicated equipment connections are necessarily based on equipment of a given manufacture. Assume responsibility for proper arrangement of pipes, ducts, etc. to connect approved equipment in a proper and approved manner. Follow equipment manufacturer's detailed instructions and recommendations in the installation and connection of all equipment. In case of conflict between manufacturer's instructions and the contract documents, notify the Architect before proceeding. No equipment installation or connections shall be made in a manner that voids the manufacturer's warranty.
- E. Duct work shown on drawings is designed to produce required air quantity at estimated pressure drop which is used for air handling unit air quantity, pressure, and motor horsepower. Actual field installation

may result in lower or higher pressure drop at the design air quantity which may require adjustment of fan speed. Take responsibility for this adjustment including replacement of fan sheave, if required, to obtain required air quantity and maintain required duct static pressure.

- F. Install all Work in a neat and workmanlike manner, using only workmen thoroughly qualified in the trade or duties they are to perform. Rough Work will be rejected.

### 3.2 CONDENSATE DRAIN PIPE INSTALLATION

- A. Install condensate piping in a workmanlike manner, according to the best practice of the trade, properly pitched and vented to eliminate air pockets or traps, and to ensure rapid drainage from each unit. Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends of copper pipe, clean soldering surface thoroughly, flux, assemble and solder before surfaces oxidize. Use approved non-corrosive flux. Use sufficient heat for complete penetration of solder and wipe away excess flux and solder. Remove burrs from ends of PVC pipe, clean joining surfaces thoroughly and form all joints in accordance with the pipe manufacturer's recommendations.
- B. Provide a valve, female hose connection with hose thread cap and rubber washer, and 4" deep trap to prevent back suction into the air unit as detailed on drawings.
- C. Run condensate drain line from each A/C unit as noted on the drawings.
- D. Install condensate drain trap float switch, when approved by local municipal Authority having jurisdiction, to turn off unit if condensate backs up in trap.
- E. Condensate line sizing shall be as follows unless noted otherwise on drawings:
  - 1. Up to 5 tons: 1"
  - 2. 6 to 30 tons: 1-1/4"
  - 3. 31 to 46 tons: 1-1/2"
  - 4. 47 to 78 tons: 2"
  - 5. 79 to 140 tons: 2-1/2"
  - 6. 141 to 230 tons: 3"
  - 7. 231 to 336 tons: 4"
- F. Install all condensate lines located underground or under the building floor in PVC conduit with wide sweep elbows. Seal space between piping and PVC conduit at each end of conduit to eliminate entry of water.

### 3.3 REFRIGERANT PIPE INSTALLATION

- A. Size and install all refrigerant piping to complete the system connecting heat pumps/condensers to air handlers in accordance with the equipment manufacturer's instructions based on equipment size, route of piping, and good refrigeration system practice. Layout piping in most direct route to minimize amount of system refrigerant. Install refrigerant tube size to minimize pressure drop and provide for oil return to compressor. Braze all joints with 15% minimum silver alloy solder.
- B. Run horizontal piping above ceilings and vertical piping inside walls in finished spaces (not including mechanical rooms).
- C. After completion of entire system and before any pipe is covered, test the entire refrigerant circuit to assure that it is absolutely tight. Conduct low-side test at 150 psi; high-side at 300 psi.
- D. After completion of leak testing, evacuate and charge the system utilizing a procedure approved by air conditioning unit's manufacturer.

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- E. Install all refrigerant lines located underground or under the building floor in PVC conduit sized to contain both the liquid and hot gas lines including required insulation. Seal space between piping and PVC conduit at each end of conduit to eliminate entry of water.

3.4 PIPE ASSEMBLY

- A. Sweat Joints in Copper Pipe (other than refrigerant piping): Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends, clean soldering surface thoroughly, flux, assemble and solder before surfaces oxidize. Use approved non-corrosive flux. Use sufficient heat for complete penetration of solder and wipe away excess flux and solder.
- B. Solvent Weld Joints in PVC Pipe: Cut pipe squarely to accurate length for full penetration into fittings. Remove burrs from ends, clean joining surfaces thoroughly and form all joints in accordance with the pipe manufacturer's recommendations.

3.5 PIPE HANGER INSTALLATION

- A. Space hangers for horizontal refrigerant piping 6 feet on center.
- B. Space hangers for horizontal copper condensate piping 8 feet on center.
- C. Space hangers for horizontal PVC condensate piping 4 feet on center.
- D. Space hangers for horizontal pipe as follows:

Plastic pipe	4' on center maximum
Copper pipe	
1/2" and smaller	6' on center maximum
3/4" to 1-1/2"	8' " " "
Steel pipe	12' on center maximum
- E. Attach hanger rods to sufficiently rigid structural building members. If hangers shall be attached to either the top chord or bottom chord of steel bar joist, attach the rods by clamp at the panel points. Do not under any circumstances burn or drill holes in either chord. Do not weld either chord.
- F. Provide additional hangers or anchoring devices necessary for proper support of piping at corners, tops of risers, etc.
- G. Provide galvanized steel shields over pipe insulation at pipe supports.

3.6 HVAC DUCT WORK

- A. Install all duct work in accordance with SMACNA standards. Install extractors and air balance dampers in all branch take offs including take offs to supply diffusers. Paint inside of diffusers and duct visible through diffusers flat black.
- B. Support duct from building structure with straps, rods, or angles as detailed in "HVAC Duct Construction Standards - Metal and Flexible" as published by SMACNA. Horizontal and diagonal joist bridging shall not be considered part of building structure for duct supporting purposes. Where joist are located too far apart for duct support or duct runs are parallel to joist, provide angles between joist designed to support duct without sagging.
- C. Seal all transverse joints and longitudinal seams in ductwork in accordance with SMACNA standards regardless of pressure and seal class. Pressure test all ductwork in accordance with SMACNA "HVAC Air Duct Leakage Test Manual" and provide test results in a report form for approval by the Engineer prior to installing duct insulation.
- D. Fabricate and install fiberglass return air and transfer air duct system in accordance with the latest edition of "Fibrous Glass Duct Construction Standards", SMACNA, for 2" W.G. static pressure and 2,000

fpm velocity. Furthermore, closure systems for longitudinal seams and transverse joints shall be in accordance with procedure necessary to comply with Section III, CLOSURES. Joint sealing shall be made with glass fabric and mastic in accordance with local codes.

- E. Fabricate and install phenolic outside air duct system in accordance with manufacturer's requirements including joint sealant system.
- F. Install flexible ducts with a minimum run and with a minimum of bends. No run shall exceed 12 feet for diffusers and bends shall have a minimum radius of 1-1/2 times the diameter of the duct measured from the center line. Seal all joints and connections. Connect flex duct to spin-in and air distribution fittings using metal clamps; nylon draw bands and wire straps will not be accepted. Support flexible duct from building structure. Do not lay on light fixtures or ceiling. Flexible duct sizes shall be as noted on drawings.
- G. Make all supply, return and outside air duct connections to air handling units with flexible connectors specifically designed for equipment used.
- H. Optional fibrous glass duct system shall be fabricated in accordance with the latest edition of "Fibrous Glass Duct Construction Standards", SMACNA, for 2" W.G. static pressure and 2,000 fpm velocity except reinforcement with tie-rods will not be permitted. Furthermore, closure systems for longitudinal seams and transverse joints shall be in accordance with procedure necessary to comply with Section III, CLOSURES. Lap all joints a minimum of 2" with glass cloth and embed glass fabric in coat of white mastic and cover glass fabric with white mastic (Duct tape shall not be used).

### 3.7 BALANCE DAMPERS

- A. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts and at other locations shown on drawings. Install balance dampers at all flex duct connections for return air grilles and supply air diffusers except where only one device is connected to a branch duct.
- B. Install automatic/motor operated volume dampers where shown on drawings and in accordance with manufacturer's instruction.

### 3.8 ACCESS DOORS

- A. Provide wall/ceiling access doors at dampers, valves, air vents, fire damper access doors, and like items requiring adjustment or maintenance accessibility if they cannot be located over lay-in type ceilings or in attic and mechanical rooms. Obtain approval from Architect for location of access doors.
- B. Provide access doors in ducts within arm-reach of fire dampers and located to permit opening and resetting fire damper shutter. Locate access doors over lay-in type ceilings. Provide ceiling access doors if duct access doors cannot be located over lay-in type ceilings. Provide access doors in walls behind which duct access doors are located. Obtain approval from Architect for location of access doors.
- C. Provide visible markers on finished side of lay-in type ceiling grid to indicate locations of duct access doors, valves, adjustable dampers, air vents, fire damper access doors, FTUs, VAV boxes and like items. See Architect for marker type.

### 3.9 CONTROLS – GENERAL

- A. Furnish all controls and control wiring to provide for proper performance of equipment.
- B. Install all high voltage (120 V or above) control wiring in EMT conduit. Install low voltage control wiring in conduit unless concealed in walls or above finished ceilings. Use plenum rated wire above ceilings

when used as supply and return air plenums. Do not run low voltage control wiring in the same conduit as high voltage control or power wiring.

- C. Connect each time clock channel to 24 volt output of the energy recovery unit and outside air motor operated damper in a manner agreeable to unit manufacturer.
- D. Install room thermostats where shown on drawings and 48" above the floor unless otherwise noted on drawings. Program thermostats to run supply fan continuously during building occupied periods and in the "auto" mode during building unoccupied periods.
- E. Furnish all controls to provide for proper performance of equipment as specified in "Sequence of Operation".

### 3.10 CONTROLS - SEQUENCE OF OPERATION

- A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. The controls shall be designed to efficiently maintain temperatures between 68° F (heating) and 78° F (cooling) in all spaces supplied with conditioned air.
- B. Each air handling unit and its associated compressor/condenser unit shall be controlled by a wall mounted programmable thermostat. The start times shall be set for the same occupied period and the stop times shall be set for the same unoccupied period. The air handling unit supply fan shall be programmed to run continuously during the occupied period and run in the "auto" mode during the unoccupied period.
- C. The time clock shall be set for the same occupied time as the three air handling units. During the occupied mode the outside air motor operated damper shall open and the energy recovery unit fan shall run. During the unoccupied mode the energy recovery unit fan shall stop and the outside air motor operated damper shall close.

### 3.11 EQUIPMENT SUPPORTS INSTALLATION

- A. Furnish, fabricate, shop paint, and erect all structural supports and platforms as required for all equipment installed in this Work, unless otherwise specified. Make these supports and platforms independent of all other equipment supports and suspend them from the building structural steel, inserts imbedded in concrete slabs, or support them on columns as required by the drawings. Attachments to steel bar joists shall be approved by the Architect and must only be at panel points. Do not, under any circumstances, burn, drill or weld either chord of steel bar joist.
- B. Install galvanized steel supports under vertical air handling units up to 2,000 cfm to allow installation of return air ducts and access to filters and unit access panels.

### 3.12 EQUIPMENT INSTALLATION

- A. Install all equipment in accordance to equipment manufacturer's instructions. Install all equipment to permit removal of coils, fan shafts and wheels, filters, belt guards, sheaves and drives, and all other parts requiring periodic replacement or maintenance.
- B. Arrange equipment to permit ready access to valves, cocks, traps, starters, motors and control components, and to clear the openings of swinging and overhead doors and of access panels.

### 3.13 WALL LOUVERS

- A. Install outside air intake and exhaust louvers where shown in Architectural drawings. Insect screens on air intake louvers shall be made accessible from the building side of louver through access doors in duct

work or from the outside through removable louver frame. Seal all joints weather tight between wall and louver frame to prevent leakage.

### 3.14 IDENTIFICATION OF EQUIPMENT AND EQUIPMENT LOCATIONS

- A. Securely attach manufacturer's nameplate to all equipment giving data as to design and operating characteristics.
- B. Securely attach nameplates to all switches, starters, gauges, control devices, including thermostats, and similar items, giving the name and number of the item of equipment to which it is connected.

### 3.15 OILING AND SERVICING

- A. Protect all bearings and packing glands during installation. Before the equipment is placed in operation, fill all bearings and packing glands with the type lubricant recommended by the equipment manufacturer. Prior to final acceptance adjust all equipment to operate properly.

### 3.16 INSULATION – GENERAL

- A. Use application details in accordance with the insulating material supplier's recommendations except where a higher standard is specified herein. Clean exterior of all piping and duct work of foreign substances, including moisture, prior to application of insulation. Apply insulation to piping and duct work with all joints tightly fitted to eliminate voids. Replace broken or damaged insulation with new insulation and joint material.
- B. Replace or repair all existing insulation disturbed by new work and refinish to match adjacent insulation.

### 3.17 REFRIGERANT PIPING INSULATION

- A. Run covering for piping unbroken through hangers. Cover all insulated refrigerant piping exterior to building with banded aluminum jackets. Install and secure all aluminum jackets in accordance with manufacturer's instructions.

### 3.18 PIPING INSULATION – GENERAL

- A. Run covering for piping unbroken through hanger clevises, sleeves, etc. Avoid metal-to-metal contact between pipes and hangers. Insulate exposed risers same as specified for each piping system and, in addition, provide banded aluminum jackets to at least 6 feet above floor. Extend tops of aluminum jackets to same height in each room. Cover all insulated piping exterior to building with banded aluminum jackets. Install and secure all aluminum jackets in accordance with manufacturer's instructions.
- B. Provide an insert, not less than 6" long, of the same thickness and contour as adjoining insulation, between support shield and piping, but under the finish jacket, on piping 2" or larger, to prevent insulation from sagging at support points. Use heavy density insulating materials suitable for the specified temperature range and strong enough to prevent crushing. Cover fittings, valves, irregular surfaces, etc., with same insulation specified for piping including jacket. Cut jacket to fit without wrinkles or folds.

### 3.19 DUCT WORK INSULATION

- A. Insulate all sheet metal supply air, outside air, transfer air, and return air duct work, except those specified for acoustic duct liner or as pre-insulated double wall ducts, located in concealed spaces with flexible external insulation.
- B. Insulate backs and necks of all diffusers and return grilles with flexible external insulation.

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- C. Insulate all sheet metal supply air, outside air, transfer air, and return air duct work, except those specified for acoustic duct liner or as pre-insulated double wall ducts, located in areas exposed to view whether areas are air conditioned or not, and return air plenum for vertical air handling units with semi-rigid external insulation.
- D. Extend end of duct liner at least 12" past the end of the external insulation.

3.20 AIR SYSTEM TEST AND BALANCE

- A. The Test and Balance (TAB) Agency, completely independent from Contractors installing work under this specification section, shall perform all test and balance work in accordance with the recommendations of the Associated Air Balance Council (AABC) or the National Environmental Balancing Bureau (NEBB), and after the entire mechanical system has been completed and is in full working order.
- B. TAB Agency shall contact the Architect and provide the schedule for TAB work at least one week prior to start of TAB work to afford the Architect the opportunity to visit the job site during the TAB work.
- C. TAB Agency shall make provisions in the contract to meet the Architect at the job site after the TAB report has been submitted to spot check at least 10% of the TAB tested points. TAB Agency shall furnish equipment and TAB technician to complete these spot checks in the presence of the Engineer.
- D. The organizations approved for Test and Balance work for this project shall be certified by AABC or NEBB.
- E. Take responsibility for the following:
  - 1. Place all heating, ventilating, and air conditioning systems and equipment into full operation and maintain operation during each working day of the TAB Agency.
  - 2. Make any changes required for correct balance, as recommended by the TAB Agency, at no additional cost to the Owner. Such changes may encompass but are not limited to pulleys, belts, duct work, dampers, or the addition of dampers and access doors.
  - 3. Furnish TAB Agency with full set of applicable shop drawings, submittal data, and manufacturer's performance data.
  - 4. Provide assistance to TAB Agency for operation of control system during TAB work.
- F. TAB Agency shall complete all following specified work:
  - 1. Mark all duct traverse points and other information on set of reproducible HVAC drawings. Assign ID numbers to all diffusers and grilles, note ID numbers on reproducible HVAC drawing, and use ID numbers in TAB report.
  - 2. Before commencing work, verify that systems are complete and operable. Ensure the following:
    - a. Equipment is operable and in a safe and normal condition.
    - b. Temperature control systems are installed complete and operable.
    - c. Proper thermal overload protection is in place for electrical equipment.
    - d. Final filters are clean and in place.
    - e. Correct fan rotation.
    - f. Duct systems are clean of debris.
    - g. Fire and volume dampers are in place and open.
    - h. Coil fins have been cleaned and combed.
    - i. Access doors are closed and duct end caps are in place.
    - j. Air outlets are installed and connected.

- k. Duct system leakage has been minimized.
3. Report any defects or deficiencies noted during performance of services to the Engineer. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance. Beginning of balance work means acceptance of existing conditions.
4. Adjust all air systems to the design values.
5. Test and record all actual motor currents and note corresponding nameplate full load amperes.
6. Test and adjust rpm of all blowers, fans, and similar air handling devices to within 10% plus or minus 5% of design quantities. Make pitot tube traverses of all main exhaust, supply, and return ducts and obtain air flow of each fan. Test and record each system's starting pressure, suction and discharge. Test and adjust system for design recirculated and outside air flows.
7. Test and adjust each diffuser, grille and register to within 5% of design requirements and identify and list each grille, diffuser and register. Use manufacturer's ratings on all equipment for required calculations.
8. Recorded data shall represent actually measured, or observed conditions.
9. Permanently mark settings of dampers and other adjustment devices allowing settings to be restored. Set and lock memory stops.
10. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
11. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
12. Upon completion of test and balance work, insert all data, including copy of marked-up HVAC drawing, into a complete typewritten report and submit six (6) copies of this report to the Architect.

### 3.21 INSTRUCTION OF OWNER'S REPRESENTATIVE

- A. After final acceptance of all Work and occupancy of building, provide service to make system adjustments to suit conditions created by the occupancy; instruct Owner's operating personnel in operation adjustment and maintenance procedures of system components, acquaint them with locations and functions of valves, control devices, etc., in the system, and instruct them in the operation of the HVAC control system.
- B. The actual time of instruction shall be as required to fully prepare Owner's operating personnel to properly operate and maintain the systems as designed and installed but shall not be less than one (1) day for all equipment location and adjustments.

### 3.22 CLEANING AND RUBBISH

- A. During the Work, keep the premises clear of rubbish created as a result of the Work. Protect and prevent unnecessary induction of dirt and thoroughly clean all equipment used for temporary heat and/or ventilation.
- B. Use and maintain adequate filters in all fan coil equipment used for temporary heat and/or ventilation. Replace with new filters after construction and before units are placed in service. Close all air duct openings to effectively prevent the entrance of dust and construction debris during construction.



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- C. On completion of the Work, remove all rubbish and debris resulting from the Work and dispose of same. Thoroughly clean and leave in a satisfactory condition for use all equipment, pipe, fixtures, duct work, etc.

3.23 RECORD DRAWINGS

- A. The Architect will furnish prints of the mechanical drawings as issued for this contract. Use these prints to indicate accurately and neatly any deviation in the actual installation from the drawings as issued. At the completion of the job, deliver the marked-up drawings to the Architect for a permanent record of the exact location of all equipment, pipe runs, etc. as incorporated in the job.

3.24 COMPLETE SYSTEMS

- A. Leave all systems completely operative in all details and in satisfactory working condition, as determined by the Architect. Furnish and install as part of this contract all apparatus and material obviously a part of the systems and necessary for their operation.
- B. Coordinate work specified herein and shown on mechanical drawings and insure completion in a timely and proper manner. Prior to requesting "Substantial Completion Inspection", provide the Architect with letter stating all requirements of this section have been met. Letter shall contain itemized list indicating each item has been personally checked by the Superintendent and that it is ready for inspection. With letter, provide reports, schedules, etc., as required. This section is intended as a checklist to insure items specified are properly installed and to insure against premature "Substantial Completion Inspection" requests.
- C. Check air distribution systems and insure systems are properly tested and balanced. Check filters and, if dirty, install new filters in units with disposable type filters and remove, wash and reinstall filters in units with permanent type filters. Dirty filters shall be defined as pressure drop exceeding 0.5" W.G. Provide one additional set of disposable and/or metal, washable, permanent, type filters as applicable for each unit. Lubricate fans, motors, and all other moving equipment requiring lubrication. Provide a maintenance schedule listing each piece of equipment requiring lubrication, points to be lubricated, product and device to be used, and frequency of lubrication required.
- D. Check and insure all equipment is properly installed, mounted as specified or shown and in accordance with manufacturer's recommendations. At equipment start-up, insure controls, power wiring, and interlocks are complete. Check alignment of motors and drives. Verify overload heaters are properly sized and installed. Check for proper motor rotation. Provide specified system identification.
- E. Provide for thorough cleaning of installation. Cleaning shall include removing temporary covers; removing adhesive applied stickers except those giving specific maintenance instructions which were intended to remain on equipment; removing cord and wire affixed tags; removing paint, coating and adhesive spatters; and vacuuming inside air handling unit plenums.
- F. Provide for touch-up painting of factory finished equipment. Touch-up painting is intended to cover minor dents, scratches, and scuff marks. Prepare surface by light sanding or remove rust with chemical compounds designed for application and coat surface with primer followed by matching top coat. Where equipment has major surface damage and/or rusting, refinish entire equipment surfaces as directed by the Architect.
- G. Provide all specified operation and maintenance manuals. Obtain letter from Owner stating specified operating instructions have been completed.

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END OF SECTION 15500

## **SECTION 26000 - ELECTRICAL**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION OF WORK**

- A. The General Provisions of the Contract, Division 1, including the General Requirements, Supplementary Conditions and Special Conditions, along with the General Requirements, are hereby made a part of this Section as if fully repeated herein.
- B. Scope of Work: Included under this section of these specifications shall include complete electrical systems as shown on the drawings and specified herein. This work shall include:
  - 1. Temporary electric service and distribution for construction purpose.
  - 2. Permanent building service entrance equipment and feeder distribution.
  - 3. Trench excavation, pumping, backfilling and compaction for all underground electrical work.
  - 4. Building panelboards and branch circuits to electrical devices, lighting fixtures, and other electrically operated equipment.
  - 5. Empty conduits and outlets for voice/data network cabling.
  - 6. Coordination.

#### **1.2 CODES, ORDINANCES AND PERMITS**

- A. Comply with all codes applying to the Work of this contract including but not limited to the 2010 Florida Building Code, the National Electrical Code (NEC), National Electrical Safety Code, ADA and OSHA, and Florida Life Safety Code 2009 Edition. Obtain information on all code restrictions and requirements. In case of conflict between the contract documents and a governing code or ordinance, such conflict shall be immediately brought to the attention of the Architect for resolution. Extra payment will not be allowed for work required by code restrictions except through written agreement with the Owner.
- B. Apply for, obtain, and pay for all required permits and inspection certificates. Final payment is contingent upon delivery of such certificates to the Architect.
- C. Although not a State requirement, a minimum of one licensed Journeyman Electrician shall be present for every 5 electrical workers on the jobsite throughout the course of construction.
- D. Where applicable, all materials and equipment shall bear the Underwriters' Laboratories seal. Certificates to this effect shall be furnished to the Architect upon request.

#### **1.3 SITE INSPECTION**

- A. Visit the site and thoroughly inspect conditions affecting the work before submitting bid. Assume responsibility for meeting all existing conditions including access and work space limitations.

1.4 DRAWINGS AND SPECIFICATIONS.

- A. Refer to the general construction drawings which are bound with the drawings of this Work for construction details, elevations, etc. Architectural and structural drawings shall take precedence over Division 16 drawings (Electrical Drawings).
- B. It is the intent of the drawings and specifications to call for finished Work, tested, and ready for operation, and in complete conformance with all applicable codes, rules and regulations. Minor details not usually shown or specified, but manifestly necessary for the proper installation and operation of the various systems, shall be included in the Work and in the proposal, the same as if specified or shown on the drawings.
- C. Specifications and drawings shall be considered as supplementary to each other, requiring materials and labor indicated, specified, or implied by either specifications or drawings. If any departures from the drawings and specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted to the Architect for approval. No departures shall be made without prior approval of the Architect.
- D. Specific reference in the specifications to any article, device, product, material, fixture or type of construction, etc., by proprietary name, make or catalog number shall be interpreted as establishing a standard of quality and shall not be construed as limiting competition. Substitutes may be used subject to compliance with requirements set forth herein, and in the General Requirements, Division 1, and as approved by the Architect.

1.5 SUBMITTALS

- A. Submit shop drawings, catalog sheets, or other descriptive data with sufficient information to establish design, quality and performance.
- B. Any submittal package which is submitted without specific model numbers for all equipment indicated will result in the entire package being rejected. Data shall describe apparatus, equipment, panels, fixtures, and other items requiring descriptive literature. Submittals shall include the following:
  - 1. Light fixtures
  - 2. Panelboards
  - 3. Safety switches
  - 4. Wiring devices & plates
  - 5. Occupancy sensors
  - 6. Floor outlet boxes
  - 7. Time switches
  - 8. Lighting contactors
  - 9. Lightning protection system
  - 10. Surge Protective Devices (SPD)

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- C. Review of the submittals does not grant the contractor leave to proceed in error. The requirements of the drawings and specifications must be followed and are not waived or superceded in any way by the submittal review.
- D. Submittal data may be submitted for review and 'revised and resubmitted' only two times without cost to the contractor. Each subsequent submittal shall be reviewed for a flat fee of \$100.00 payable to the reviewing engineer.

1.6 MAINTENANCE DATA

- A. Collect and neatly retain maintenance and service data supplied with equipment furnished and installed under this contract until job completion, at which time deliver to the Architect for inclusion in the Maintenance Manual. All such data must be properly identified as for equipment served.
- B. Keep one set of prints current of any changes or variations by marking prints in a legible manner; and upon completion of project, deliver prints to the Architect. Do not make changes without prior approval of the Architect.

1.7 TEMPORARY ELECTRIC SERVICE

- A. Provide complete temporary system of power and lighting wiring for use during construction and for testing of equipment. Comply with OSHA and NEC including personnel ground-fault protection requirements.

1.8 ELECTRIC SERVICE

- A. Building electrical service will be provided by local utility and arranged generally as indicated on drawings.
- B. Provide all labor, materials and equipment not provided by the utility in accordance with the utilities' installation policies, specifications and procedures without additional cost.
- C. The contractor shall contact the utility in advance and verify availability and arrangements for electrical service as indicated. Should a significant installation conflict occur, notify the Architect immediately for resolution before starting any work.

1.9 COORDINATION - GENERAL

- A. Drawings are generally diagrammatic. Review all project drawings and coordinate all work with general contractor and different trades prior to installing any work so that interferences between electrical work and ducts, piping, equipment, architectural and structural work will be avoided. Do not install conduits, boxes and fittings in spaces required for ductwork or piping.
- B. Furnish all necessary offsets in raceways, fittings, etc., required to properly install work so as to take up minimum space. Install all equipment to provide code required 'working space'. Furnish and install all materials required to accomplish this without additional cost.

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- C. In case interference develops, the Architect will decide which trade work must be relocated regardless of which was installed first. Damage from interference or rework caused by inadequate coordination with other trades shall be rectified without additional cost.
- D. Within 30 days following award of contract, report to the Architect in writing all real or potential errors, ambiguities and/or conflicts on electrical work or between trades. Those reported after 30 days, except as a result of unforeseen circumstances, shall be resolved at the discretion of the Architect. Report conflicts resulting from progress of work to the Architect immediately.

1.10 COORDINATION - ELECTRICAL / MECHANICAL

- A. Unless specifically required otherwise, all motors, integral starters, control and monitoring devices, timers, relays, pilot devices and other required control components will be furnished under Division 15.
- B. Unless specifically required otherwise, furnish and install disconnect switches, fuses and power wiring connections to all equipment as indicated on drawings or as specifically required by the equipment manufacturer.
- C. The mechanical contractor shall furnish and install all heating, ventilation and air conditioning equipment, including all control devices and control wiring.
- D. Unless specifically required otherwise, make all power wiring connections to all water heaters, pumps, machinery, appliances and other electrically operated equipment as indicated on drawings or as required. Furnish and install disconnect switches and starters as indicated on drawings, except for items furnished with integral disconnect switches and/or starters.
- E. Install and connect all separate disconnect switches and line voltage control devices furnished with the equipment but not factory mounted and connected on the equipment.
- F. Review shop drawings and verify final electrical characteristics and wiring before rough-in of power feeds to any equipment to be provided. When electrical data on shop drawings differs from contemplated design, make necessary adjustments to wiring, disconnect, and branch-circuit protection for equipment actually installed.

1.11 WORKING CLEARANCES

- A. Working clearances around electrical equipment requiring service shall comply with NEC requirements. Coordinate and verify clearances from equipment and work furnished by other trades. Should there be any apparent violations of clearance requirements, notify the Architect before proceeding with connection or placement of equipment. Rework caused by inadequate coordination shall be rectified at no extra cost.

PART 2 – PRODUCTS

2.1 MATERIALS

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- A. All materials used in this project shall be new, unless otherwise noted, and listed by the Underwriters' Laboratories, Inc. as conforming to its standards where such standards have been established. These materials shall bear the U.L. label.
- B. Where materials, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired design or quality and shall be basis of bid. Alternatives may be submitted to Architect for consideration.

2.2 DISTRIBUTION EQUIPMENT

- A. Panelboards shall be molded case circuit breaker type with completely dead fronts enclosed in code gauge, galvanized sheet steel cabinets with adequate wiring gutters top, bottom and sides. Neutral bus bars shall be 100% rated, insulated for panelboards shown with neutral. Front trim shall contain hinged door with keyed lock and catch. Door shall be provided with plastic enclosed circuit directory. Upon completion of installation, circuit directory shall be typewritten indicating usage and location of circuits as indicated on drawings.
- B. Circuit breakers shall be single or multi-pole molded case, of common handle, common trip without handle ties, thermal magnetic, quick-make, quick-break, for manual and automatic operation. Refer to schedules on drawings for details regarding panel types, capacity, interrupting rating, mounting and other information. Circuit breakers which protect branch circuits which share a common neutral shall be multi-pole type as required by code. Circuit breakers which are indicated to serve permanently connected appliances such as water heaters, dishwashers, etc., shall be capable of being locked in open position.

2.3 SAFETY SWITCHES

- A. Safety switches shall be quick-make, quick-break, general duty type in sheet steel enclosure, NEMA-1 for interior locations and NEMA-3R for exterior locations as required for rain tight installations, with door cover interlock. Fuse type and size shall be as indicated or as specifically required by the equipment manufacturer.

2.4 MOTOR CONTROL RELAYS

- A. Motor control relays shall be general purpose power type with 24VAC coil, 30 ampere rated SPST or DPST contacts as required for fan motor electrical characteristics, Square 'D' Class 8501, Type C or equal. Install relay inside metal box adjacent to fan to be controlled. 24VAC control wiring will be provided by mechanical contractor.

2.5 LIGHTING CONTACTORS

- A. Lighting contactors shall be totally enclosed, magnetic type, electrically held, with voltage rating, ampacity and number of poles indicated on drawings. Provide contactor control from photocell or time switch as shown on drawing.

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- B. Contactor enclosure shall be NEMA-1 type cabinet for interior and NEMA-3R for exterior locations.

2.6 CONDUIT

- A. Electrical metallic tubing (EMT) with set screw fittings shall generally be used for building interior, and all feeders and branch circuit homeruns, except where exposed to physical damage, unless otherwise indicated or specified herein.
- B. Rigid or intermediate metal conduit with galvanized fittings and hardware shall be used on building exterior where exposed to weather.
- C. Rigid nonmetallic conduit (schedule 40 PVC) shall be used underground and in concrete slabs. Minimum PVC size shall be 1". Floor penetrations shall be rigid galvanized ell's.
- D. Flexible conduit shall be used for final connections to motors, appliances and vibrating equipment.
- E. Metal-clad cable (Type MC) with approved fittings may used where totally concealed and as permitted by codes. Although not required by code, where type MC is utilized, all raceways shall contain an equipment grounding conductor, and in addition, one conductor more than shown on drawings.
- F. Electrical nonmetallic tubing (ENT) shall not be used.
- G. In locations where exterior devices are connected to an interior device via a common raceway, provide silicone sealant in conduit at junction box in interior and exterior locations after branch circuit wiring has been installed. Sealant shall be applied to inhibit air flow in raceway between interior and exterior device locations.
- H. For recessed panels, provide a minimum of five (5) empty ¾" EMT from panel to above accessible ceiling space.

2.7 SURGE PROTECTIVE DEVICES (SPD)

- A. Surge protective devices shall be listed or comply with the most recent editions of: Underwriters Laboratories: UL1449 (3<sup>rd</sup> Edition) and UL 1283, ANSI/IEEE C62.41.1-2002, C62.41.2-2002, C62.45-2002, UL96A (Lightning Protection Master Label Compilant), National Electrical Code: Article 285.
- B. Subject to compliance, the following manufacturers are acceptable:
  - 1. Advanced Protection Technologies.
  - 2. Surge Suppression Incorporated.



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- C. SPD shall be UL labeled with a 200kA Short Circuit Current Rating (SCCR), as a Type 1 device, and a 20kA nominal (I-n) rating. All modules shall be replaceable. The Minimum surge current capability (single pulse rated) per phase shall be a function of the application as follows:

1. Service Entrance or Transfer Switch: 300kA
2. Distribution panelboards & MCC: 200kA
3. Branch panelboards: 100kA

- D. UL 1449 Listed Voltage Protection Ratings (VPRs) shall not exceed the following:

<u>System Voltage</u>	<u>L-N</u>	<u>L-G</u>	<u>L-L</u>	<u>N-G</u>	<u>MCOV</u>	
208Y/120		700V	700V	1200V	700V	150V

- E. SPD shall include green visual LED diagnostic for each phase, and a built in surge counter.
- F. SPD shall have a minimum 10 year factory warranty. Provide all wiring/conduit connections in accordance with manufacturer's recommendations.

## 2.8 CONDUCTORS

- A. All conductors shall be copper and shall not be smaller than #12 except where otherwise noted. Conductors smaller than #8 shall be solid. Conductors #8 and larger shall be stranded.
- B. Conductor insulation shall generally be XHHW or THHN as required for dry, damp or wet locations per NEC. Conductors subjected to higher ambient temperatures shall be derated in accordance with NEC.

## 2.9 OUTLET BOXES

- A. All outlet boxes, extensions, and cover frames shall be galvanized sheet steel for concealed locations or cast metal for exposed locations unless otherwise noted. Boxes shall be 1 1/2" deep, minimum, and shall be sized to accommodate the installed conduit, conductors and device. Boxes to which fixtures are installed shall have studs and straps to support fixture weight. Where more than two switches are located side by side, outlet box shall be multi-ganged type as required for switches to be mounted under single cover plate. Provide divider plate between each device within multi-gang outlet.
- B. Boxes for installation in concrete block wall construction shall be gang type, 3 1/2" deep for switch devices and 4" square by 1 1/2" deep, with 1 1/4" single and two gang square corner extension covers for receptacle and junction purposes. Boxes for installation in brick wall construction shall be gang type, 3 1/2" deep. Boxes installed in plastered walls shall be 4" square by 1 1/2" deep, with 3/4" single and two gang plaster covers. All boxes shall have internal mounting ears or threaded tappings.
- C. Boxes for installation in fire rated walls or ceilings shall be 2"x4" or 4" round metal type. Spacing shall be a minimum of 24" apart. 4" square boxes shall be permitted provided they are equipped with a 2"x4" extension ring and spacing is a minimum of 24" on center. Aggregate

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area of the openings provided for the boxes shall not exceed 100 square inches per 100 square feet of wall space.

- D. Floor outlet boxes shall be fully adjustable, flush type, with top cover plates and matching carpet flange plates as required. Wiremold #RFB4/DTB-2-4TKO/RFB-WTB/S36CCTC(AL)(BS)(BK).
- E. Floor outlet boxes for both combination type floor outlets single service floor outlets shall be UL listed for scrub water exclusion test (UL514A and UL514C).

#### 2.10 PULL AND JUNCTION BOXES

- A. Pull and junction boxes shall be constructed of code gauge galvanized sheet steel and fitted with screw covers held in place with corrosion resistant machine screws.
- B. Provide boxes where noted on drawings or where necessary to facilitate conductor pulling and splicing. Splicing of conductors is to be avoided as much as possible with continuous lengths being preferred. Box sizes shall conform to sizes required by NEC or as indicated on drawings.

#### 2.11 WIRING DEVICES

- A. All wiring devices shall be commercial grade and product of one manufacturer throughout project except as otherwise noted. Device color shall be determined in shop drawing stage and shall be as directed by architect
- B. Wall switches shall be 20 ampere, 120-277V, A.C., toggle handle, quiet type, with side and back wiring terminals . Switches shall be single or multi-pole as indicated on drawings. Tamper resistant receptacles shall be equipped with integral mechanical shutter system which prevents insertion of any object in one side.
- C. Wall and ceiling occupancy sensors shall be dual technology, ultrasonic and passive infrared type. Wall occupancy sensors shall be provided with integral on/off manual switch. Manufacturer shall be Wattstopper or approved equal. Provide vandal resistant type in locations indicated on drawings. Open area and Corridor occupancy sensors shall be ceiling mounted in locations generally as shown. Ultrasonic sensing shall be volumetric in coverage with a frequency of 40 KHz. It shall utilize Advanced Signal Processing which automatically adjusts the detection threshold dynamically to compensate for constantly changing levels of activity and air flow throughout controlled space. To provide superior small motion detection and immediate activation upon entry, coverage of both technologies must be complete and overlapping throughout the controlled area. The lens shall cover up to 2000 sq ft for walking motion when mounted at 10 ft and 1000 sq ft of desktop motion. Sensors shall have a time delay that is adjusted automatically (with the SmartSet setting) or shall have a fixed time delay of 5 to 30 minutes, set by DIP switch. Sensors shall feature a walk-through mode, where lights turn off 3 minutes after the area is initially occupied if no motion is detected after the first 30 seconds. Sensor shall have standard 5 year warranty and shall be UL and CUL listed. Contractor shall coordinate location in field to maintain 5' clear between ceiling mounted sensor and HVAC supply grilles.

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- D. Duplex receptacles shall be straight blade, 20 ampere 125V, A.C., of grounding type, Corrosion-resistant, with plated steel strap locked into face and back body to resist pulling away from face/body assembly. .032 inch thick, brass, triple-wipe power contacts for lasting retention. Easily accessed break-off, line-contact connecting tab for fast, easy split-circuit wiring. Body and face shall be impact-resistant nylon, with thermoplastic back body. Terminal compartments shall be isolated.
- E. GFI type receptacles shall be 20 ampere, 125V, grounding type, equipped with integral safety mechanism to remove power from device upon GFI component failure (UL943 compliant) with 'test' and 'reset' buttons shall be provided where indicated. GFI type receptacles shall be provided where indicated on drawings, series wiring to enable GFI protection for non-GFI type receptacles shall not be allowed. Receptacles shall be mounted with grounding insert on bottom.
- F. Dimmer switches shall be solid state linear slide type with on-off switch. Wattage shall be as indicated on drawings or as required for total wattage of the connected lamps.
- G. Device plates shall be mar-proof, rugged self-extinguishing thermoplastic, nominal 0.07" thickness as manufactured by Pass & Seymour. Device color to be determined in shop drawing review, for all flush installed outlet boxes in finished spaces. Weatherproof devices shall be equipped with rain tight in use cover. Surface mounted device outlets shall be fitted with appropriate sheet steel or cast metal cover plates to match device and box. Neither nylon nor oversized cover plates are allowed.
- H. Special purpose outlets shall be as indicated on drawings and have matching cover plate.

## 2.12 LIGHTING FIXTURES

- A. Furnish and install all lighting fixtures as shown on drawings and specified in fixture schedule. The fixture schedule is intended as a guide for selection. Unless otherwise noted, fixtures of other manufacturers will be acceptable if of similar design and characteristics, subject to approval.
- B. Although not specifically shown or specified, all light fixtures shall be provided with all necessary optional accessories and mounting hardware for installation as indicated or required.
- C. Electronic ballasts for fluorescent fixtures shall be UL Listed Class P, Type 1, flicker-free, full light output type and meeting the applicable requirements of the FCC, IEEE and ANSI with power factor not less than 90%, crest factor 1.5 maximum, frequency not less than 25,000 hertz, THD less than 10% and sound rating Class A. Ballasts shall be specifically designed for use with the type lamps indicated. Ballasts for use with compact fluorescent lamps shall be provided with 'end of life' protection to prevent ballast operation upon lamp failure. Ballast warranty shall be 5 years minimum. All fluorescent fixtures shall be provided with integral disconnect which removes power to ballast.
- D. All recessed lighting fixtures installed in insulated ceilings or ceilings which abut an attic space shall be 'IC' rated, gasketed and sealed to prevent air leakage into the conditioned space, or

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provided with a sealed box (min 1/2" thick gypsum wall board, preformed polymeric vapor barrier, or other air tight assembly manufactured for this purpose) and maintaining required clearances of not less than 1/2" for combustible material and not less than 3" from insulation material.

- E. LED fixtures shall be UL listed and shall meet efficacy requirements for fixture application and shall be listed on Design Lighting Consortium Qualified Products List.

2.13 LAMPS

- A. Furnish and install one complete set of lamps for all installed fixtures as designated in fixture schedule, on drawings or specified herein. All lamps shall be of proper design to fit specific fixture indicated. To ensure uniform lighting and color, all lamps of the same type shall be provided by the same manufacturer.
- B. Incandescent lamps shall be rated 120 volt with type and wattage as scheduled.
- C. Fluorescent lamps shall be color and size as scheduled, and designed for operation with the fixture ballast. Energy efficient type lamps shall be specifically approved for operation with the specified ballast.

2.14 TIME SWITCHES

- A. Time switch shall be solid state digital type capable of permitting set points on independent (per pole) daily schedules through a 7 day time period. Schedule programming shall be accomplished through the use of an integral numerical keypad and self prompting LED indicators. Programmable features shall include to the minute programming with up to 99 'holidays' each of which can be independently controlled, fully automatic daylight saving time adjustment with user selectable override, and automatic leap year adjustment.
- B. All programmable information shall be stored in non-volatile memory backed by a factory installed lithium battery which shall maintain clock time and calendar for 8 years (minimum).
- C. Time switch poles shall be normally open type with quantities, or type of control as indicated on drawings, each rated 120/277V and 20 amperes. Time switch shall be rated for 120/277V control voltage input/output, and shall be installed in a lockable NEMA-1 surface enclosure.
- D. Time switch shall be as manufactured by Intermatic #ET7000 series or approved equal.

2.1 LIGHTNING PROTECTION SYSTEM (PROVIDE ALTERNATE PRICE)

- A. Lightning protection systems shall be roof air terminals and grounding system designed and installed in accordance with NFPA 780.
- B. The entire system shall be designed and installed by certified lightning protection contractor. The system shall include protection for all roof equipment, appurtenances and bonding to the electrical system per UL requirements.

- C. All air terminals and roof conductors shall be aluminum. All ground conductors and ground rods shall be copper.
- D. Roof top HVAC equipment and enclosures shall not be used as conductors. All air terminals installed on roof top HVAC equipment shall be connected with conductors to the main lightning conductors.
- E. Contractor shall provide detailed design shop drawings for the complete system to indicate the location of air terminals, roof conductors, down conductors, ground rods and complete installation details.
- F. Completed system shall bear UL Master Label with all required certification and documentation.

### PART 3 – EXECUTION

#### 3.1 CUTTING AND PATCHING

- A. Place all sleeves, inserts, conduit hangers, etc. as construction progresses to avoid any unnecessary cutting of structural members. Cooperate with other contractors in location of electrical outlets that may conflict with location of other equipment.
- B. Obtain authorization from the Architect for any necessary cutting of building structure to facilitate installation of this work and do not proceed until authorization has been received. Limit necessary cutting and patching to the minimum size required for installation of conduit or apparatus.

#### 3.2 TRENCH EXCAVATION, PUMPING, BACKFILLING AND COMPACTION

- A. Excavate, back-fill and compact all trenches required for underground electrical work. Maintain trenches free of water until installation is complete and provide all necessary shoring.
- B. Contractor shall field verify all existing underground utilities and avoid damage to same. Where existing utilities are damaged, the contractor shall be responsible for all repairs or replacement.
- C. Back-fill with loose, dry granular material in 6-inch lifts and thoroughly compact each lift. Dispose of all surplus material and rock as directed by the Architect. Grade the surface to a reasonable uniformity and leave the mounding in neat condition as approved by the Architect.
- D. Back-fill all trenches passing under foundations with concrete to the underside of the foundation and at a 2:1 slope away from each side of the foundation. Back-fill all trenches that are parallel and deeper than foundations with concrete to a point that will place the top of the concrete on a 2:1 slope away from the foundation bottom. Do not back-fill trenches until required inspections are completed.

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- E. Repair or replace all topsoil, shrubbery, sod, sidewalks, streets, walls, etc. disturbed by the excavation, backfilling or pumping to the satisfaction of the Architect. Repair sidewalks in complete blocks; partial patching will not be accepted.
- F. Where interior saw cutting of trenches is required, provide extension of building's underfloor waterproof membrane as required to maintain a watertight condition.

### 3.3 GROUNDING AND BONDING

- A. Provide grounding electrode conductor for electric service equipment sized and connected in accordance with NEC.
- B. Bond equipment such as metallic housing and feeder metallic conduits to grounding conductor. Use grounding bushings, on service conduit and at other points where grounding continuity is broken.
- C. Although not specifically indicated or required by code, provide insulated green equipment grounding conductor for all feeders and branch circuits.
- D. Provide a bonding jumper for any equipment, motor, fixture or device to which current carrying conductors are connected that is not bonded directly to the grounded system. Connect bonding jumper to approved lugs and grounding conduit bushings or clamps. All non-metallic conduit shall contain an equipment grounding conductor.
- E. All grounding or bonding conductors shall be sized as required by NEC, or as herein specified, and shall be bare copper or TW insulated, with green coding.

### 3.4 RACEWAYS

- A. Follow routing for conduit installation described on drawings as nearly as possible. Routing layout, however, is diagrammatical and where changes are necessary as a result of structural conditions, apparatus, or other causes, routing will have to be changed to meet these conditions. Conduit risers and offsets are not indicated on drawings but are intended to be installed as required.
- B. Run conduit required to be exposed parallel or perpendicular to the walls, ceilings, or structural members and provide supports as required by NEC. In addition, install supports as required to form a secure and firm installation. Supports shall be galvanized pipe straps, hangers or wall brackets. Use of metal or plastic tie wires for conduit support is not allowed. Firmly support concealed conduit at the structure and install so as to prevent any vibration against structure, pipe or duct work.
- C. Fit conduit installed in concrete or secured to structural members that pass through expansion joints constructed in the building with expansion fittings, complete with copper bonding jumper.
- D. All metallic conduit terminating in outlet, junction or pull boxes and cabinets must terminate with bushing and double locknuts except exposed cast boxes, where they may be omitted.

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Conduit sizes 1 1/4" and above shall have insulating fiber bushings with double locknuts. Grounding type bushings must be used at points where grounding continuity is broken and at service equipment.

- E. Fit all empty conduit systems with suitable nylon pull-string and blank off to prevent entrance of foreign matter until conductors are installed.
- F. At motor connections, flexible connections, or connections subject to vibration, use flexible galvanized conduit with PVC outer jacket with grounding conductor.
- G. Conduit shall not be smaller than ½" trade size and must be sized to accept conductors indicated.

### 3.5 WIRING

- A. No wiring shall be installed until the required raceway system including junction, outlet and device boxes is completed. Install wiring before painting begins and protect against being painted.
- B. Branch circuit sizes are noted on drawings and must be continuous without reduction in size throughout their length except where connecting to fixtures or devices.
- C. Branch circuit wire sizes shall be increased as required where long runs will cause excessive voltage drop per NEC.
- D. Wire circuits as described or indicated on drawings to achieve a connected load as scheduled. Should any change be necessary, it must be brought to the Architect's attention.

### 3.6 BOXES

- A. The location of outlets on drawings is to be considered as approximate only inasmuch as outlets are to be centered in blocks, panels, or other modular units. Be familiar with requirements of other trades as well as the building in general to become aware of various materials and finished surfaces in which outlets are to be installed.
- B. Install boxes square and plumb with receptacle and junction boxes in a vertical position. Cover all boxes for future use or junction purposes with blank plates.
- C. Boxes in exterior locations shall be cast metal boxes with threaded conduit hubs. Securely fasten boxes to building surfaces.

### 3.7 PANELBOARDS

- A. Panelboards shall not be installed under any ducts, piping or other foreign equipment up to the structural ceiling as per code requirements. Where it appears that this condition will exist, the contractor shall notify the Architect immediately for resolution before proceeding with the

installation. Any rework caused by the lack of timely notification and coordination shall be provided without additional cost.

### 3.8 ACCESS PANELS

- A. Provide ceiling access panels for equipment, devices, boxes and other like items requiring adjustment or maintenance accessibility if they are not located over lay-in type ceilings or are not otherwise accessible. Obtain approval from Architect for type and location of access panels.

### 3.9 WIRING DEVICES

- A. Where indicated, gang devices together in common boxes with device straps bonded to metallic system or separate grounding conductor.
- B. Wiring device mounting heights shall be as follows, unless otherwise noted or required:
  1. Light switches and controls- 48" above floor to top
  2. Receptacles- 15" above floor to bottom
  3. Voice/Data outlets- 15" above floor to bottom

### 3.10 IDENTIFICATION LABELS

- A. Provide identification labels for each motor controller, safety switch, panelboard, contactor, time switch, control device, and circuit breaker. Labels shall be laminated, phenolic strips 1/16" thick and engraved to show black letters on white background not less than 1/4" high. equipment and control device labels shall be provided per code on all emergency equipment. Labels shall consist of white letters on red background. Where brackets are not provided, labels shall be mounted with screws, or approved adhesive.
- B. Where control apparatus is installed on or immediately adjacent to equipment, labels are not required.
- C. Provide UL approved arc-flash hazard marking on front cover (or other clearly visible location) of all electrical equipment as required by the NEC 110.

### 3.11 LIGHTING FIXTURES

- A. All light fixtures shall be installed in accordance with the manufacturer's installation instructions or recommendations.
- B. Connect single-connected fixtures, surface or stem hung, with heat resistant fixture wire. Connect multiple-connected fluorescent fixtures, surface or stem hung, with type THHN heat resistant thermoplastic wire of a size indicated for branch circuit.
- C. Support fixtures to be recessed in readily removable tile ceilings (lay-in type) from the T-bar tile support and connect to remote mounted 4" square junction boxes with approved six foot long, 3/8" flexible conduit 'fixture whip' with grounding conductor bonded between conduit system and fixture.



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- D. Lay-in type light fixtures installed in fire rated ceilings shall be independently supported per UL requirements.
- E. Upon project completion and just prior to delivering project to the Owner, clean all fixtures and remove all instruction tags.
- F. Exit signs shall not be mounted higher than 6'-8" above the top of any door opening (to bottom).
- G. No light fixture shall be installed without approved shop drawings signed off by the Engineer, Architect and General Contractor.

3.12 LAMPS

- A. Do not install full set of lamps until specific permission of the Architect has been obtained. Temporary lamps may be installed in permanent fixtures for construction purposes, but they must be replaced with new lamps when directed.

3.13 VOICE/DATA OUTLET CONDUIT SYSTEM

- A. Install conduits, outlet boxes and backboards as shown on drawings. Conduit shall be as previously specified, with 3/4" as the minimum size. Provide all conduits with pull-wire. Backboards shall be 3/4" plywood painted light gray with fire resistant paint.
- B. Wall outlets shall be 4" square by 1 1/2" deep with single gang extension covers and covered with blank specified plates. Floor outlets shall be floor outlet boxes as previously specified.
- C. Coordinate with local telephone company and verify routing and termination point of building telephone service entry conduits.
- D. Provide telephone service entry conduits and backboard with receptacles and ground conductor in accordance with telephone company requirements.
- E. Provide #6 stranded, green insulated, ground conductor from backboard to the electrical service ground and/or other ground sources approved and verified by the telephone company.
- F. Provide grounding electrode conductor at telephone service entry sized and connected in accordance with NEC. Ground rod shall be minimum 10' in length and 3/4" in diameter.

3.14 EQUIPMENT CONNECTIONS

- A. Make all final power feed connections to starters and/or motorized equipment installed by heating and air conditioning and plumbing contractors as indicated or required. Refer to Electrical sections of the other contractors' specifications for further information.

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- B. For air handling equipment with separate 'field installed' heater unit, provide fuse block with fuses, wiring and power connections for fan motor tapped to unit disconnect switch.
- C. Contractor shall assume that all circuit breakers indicated for 'hermetic refrigerate motor-compressor' A/C equipment are the wrong size. The contractor shall field verify and provide 'HACR' type circuit breaker sized for 'maximum-overcurrent-protection' in accordance with the nameplate data for the equipment actually supplied.
- D. Verify all equipment for service and characteristics provided prior to rough-in and connection. Provide a grounding conductor for all equipment connected with flexible conduit and bond to conduit system and metallic frame of equipment.
- E. Be responsible for securing and installing proper insulated conductors required for equipment of higher temperature range beyond that of specified branch circuit type.

3.15 CLOSE OUT DOCUMENTATION

- A. Upon project completion Contractor shall provide all operation and maintenance manuals to Owner as a single bound set which includes manufacturers' make and model number of all installed equipment including but not limited to the following:
  - 1. All submittal data stating each piece of equipment rating and selected options for each piece of equipment.
  - 2. Operation manuals and maintenance manuals for each piece of equipment requiring maintenance. Required routine maintenance actions shall be clearly identified.
  - 3. Names and addresses for at least one qualified service agency.
- B. Within 30 days of project completion, Contractor shall provide record (as-built) drawings of the actual installation. These drawings shall contain (at a minimum):
  - 1. A single line diagram of the building electrical system with complete panel schedules.
  - 2. Floor plans indicating location and area served for all distribution.

END OF SECTION 260000

## **SECTION 310000 – BUILDING EARTHWORK**

### **PART 1 – GENERAL**

#### **1.1 DESCRIPTION**

- A. Provide earthwork, including clearing and grubbing, excavation, fill, backfill and compaction for building areas and concrete walks and slabs, shown on the drawings and specified as required to complete work.

#### **1.2 QUALITY ASSURANCE**

- A. Codes and Standards: Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.
- B. Testing and Inspection Service: Contractor shall employ and pay an independent soil testing and inspection service to perform a soil survey for satisfactory soil materials, sampling and testing for quality control during earthwork operations.
- C. Test for Proposed Soil Materials:
  - 1. Test soil materials proposed for use in the work and promptly submit test result reports.
  - 2. Provide one optimum moisture-maximum density curve for each type of soil encountered in subgrade and fills under building foundations and slab areas. Determine maximum densities in accordance with ASTM D 1557, and ASTM D 4253, as applicable.
  - 3. For borrow materials, perform a mechanical analysis, AASHTO-T88 plasticity index, AASHTO T91; moisture-density curve, AASHTO-T180 or ASTM D 1557.

#### **1.3 SUBMITTALS**

- A. Test Reports: Submit two copies of the following reports to the Architect-Engineer:
  - 1. Test report on borrow material.
  - 2. Field density test reports.
  - 3. Optimum moisture-maximum density curve for each type of soil encountered.
- B. Submit Manufacturer's Literature for vibratory compaction equipment.

#### **1.4 JOB CONDITIONS**

- A. Protection: Protect structures, utilities, sidewalks, pavements, and other facilities from damages caused by settlement, lateral movement, undermining, washout and other hazards created by excavation operations. Should any uncharted utilities be found, notify the utility

company and Architect-Engineer immediately and await instructions before proceeding further with work in that location.

## **PART 2 – PRODUCTS**

### **2.1 SOIL MATERIALS**

- A. Fill and Backfill Materials: Clean, free-draining sand (max. 10% passing the 200 mesh sieve) free from organic materials.
- B. Excavated material conforming to requirements for fill and backfill material may be used for fill and backfill.
- C. Provide additional fill material from off-site when required to complete the work.

### **2.2 VIBRATORY COMPACTION EQUIPMENT**

- A. Vibratory Roller: The vibratory drum roller shall have the following minimum requirements:
  - 1. Drum roller; 48 inches.
  - 2. Static drum weights; 6,000 to 8,000 lbs.
  - 3. The architect – engineer prior to start of compaction operations shall approve roller used.
  - 4. Approved compactors include Galion, Dynapac, and Brothers.
- B. Mechanical Hand Tampers: Hand tampers shall be capable of meeting the compaction requirements specified herein.

## **PART 3 – EXECUTION**

### **3.1 CLEARING AND GRUBBING BUILDING AREAS**

- A. Clear and grub the entire building area to at least 5 feet beyond perimeter of building footings and foundation, walks and slabs to remove stumps, roots, trees, vegetation, organic material and other obstructions to the work. Grub out all roots larger than ¼ inch in diameter, matted roots and other organic material to at least 24 inches below existing surface.
- B. Strip topsoil from areas within the building and slab areas and stockpile on the site for future use in site grading.

### 3.2 EXCAVATION

- A. Excavate to depths and dimensions required for footings, slabs and structures. Remove and dispose of all obstructions to the work that are encountered above and below grade during excavation operations. Removal and disposal includes the following:
  - 1. Stumps, roots, trees and other organic materials.
  - 2. Pavement, foundations, concrete, and other inorganic materials.
  - 3. Abandoned utilities and utilities indicated to be removed.
  - 4. Organic and other unsuitable soil materials.
  
- B. Stability of Excavations:
  - 1. Slope the sides of excavation to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible either because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
  - 2. Shoring and Bracing: Provide shoring and bracing to comply with local codes and authorities having jurisdiction.
  
- C. Dewatering:
  - 1. Prevent surface water and subsurface or groundwater from flowing into excavations and flooding the project site and surrounding area.
  - 2. Do not allow water to accumulate in excavations. Provide dewatering system components necessary to convey the water away from excavations.
  
- D. Excavation for Structures:
  - 1. Conform to the elevations and dimensions shown on the drawings, with a tolerance of plus or minus 0.10 ft., and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.
  - 2. In excavating for footings and foundations, take care not to disturb bottom of the excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to the required lines and grades to leave a solid base to receive concrete.
  - 3. Where bottom of footing occurs in fill material, the fill and compaction operations shall continue until a minimum grade of 12" above bottom of footing is obtained. Footings may then be placed by excavating in accordance with methods herein specified.
  - 4. Foundations shall be constructed as soon as possible after the foundation excavation to minimize damage to the bearing surface. If the bearing surface is softened by surface water intrusion or exposure, the softened soils must be removed immediately prior to placement of concrete. The bearing surface may be protected from extended exposure or imminent rainfall by placing a 2" mat of lean concrete on the bearing surface. Increase the foundation depth accordingly.
  
- E. Cold Weather Protection: Protect excavation bottoms against freezing when the atmospheric temperature is less than 35 degrees F.

### 3.3 COMPACTION REQUIREMENTS

- A. General: Compact and fill and backfill to the same density as adjacent in-place material.
- B. Compaction Under Slabs and Structures:
  - 1. All building areas shall be compacted and densified using a vibratory drum roller as specified herein. Vibratory compaction shall extend at least 5 feet beyond perimeter of building footings and foundations, slabs and walks. A minimum of twelve complete coverages, six in each direction, shall be made with the roller. Any soft yielding areas shall be excavated and replaced with acceptable fill material. Fill shall be placed in lifts not exceeding 12 inches in loose thickness ( 6 inches for mechanical hand tampers). Continue compaction until requirements specified herein are attained.
- C. Percentage of Maximum Density Requirements: Compact soils to not less than the following percentages of the Modified Proctor maximum dry density, ASTM D 1557.
  - 1. Existing Subgrades Under Structures: Compact subgrade 24 inches below existing grade to 95 percent maximum density at optimum moisture.
  - 2. Fill and Backfill Under Footings and Foundations: Compact each layer of fill or backfill to 98 percent maximum density at optimum moisture.
  - 3. Walks and Slabs: Compact top 12 inches of subgrade and each layer of fill or backfill to 95 percent maximum density at optimum moisture.
- D. Moisture Control:
  - 1. Where the subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to the surface or subgrade, or layer of soil material, to prevent free water appearing on the surface during subsequent to compaction operations.
  - 2. Remove and replace, dewater, or scarify and air dry soil material that is too wet to permit compaction to specified density.
- E. Backfilling Under Slabs and Structures:
  - 1. Continue backfilling and compaction over entire building area to final elevation. Backfilling shall be in equal layers compatible with equipment used.

### 3.4 FIELD TESTING

- A. Number of tests:
  - 1. Make one optimum moisture-maximum density curve test in accordance with ASTM D 1557 for each class of material.
  - 2. Make in-place density tests in accordance with ASTM D 1556, ASTM D 2937, or ASTM D 4253, as applicable, as fill and backfill work progresses. Test locations shall be as follows:
    - a) approximately every 1,500-sq. ft. of building area, shall be tested;
    - b) at a minimum of 25% of isolated spread footings;
    - c) at 50 linear feet of continuous wall footings.

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- B. Work on Tested Area: Placing permanent construction over fill that has not been tested and approved may require the Contractor to remove permanent work, recompact the fill and replace the work.
  
- C. Test Reports:
  - 1. Two copies of test reports shall be transmitted directly from the laboratory to the Architect-Engineer as directed.
  - 2. Test reports shall be identified by the project title, A.E. File number, project location, and location and depth of each on-site test submitted.

END OF SECTION 310000

## SECTION 311100 – SOIL TESTING

### PART 1 – GENERAL

#### 1.01 DESCRIPTION

##### A. Work Included:

1. Laboratory testing of soil samples
2. In-place density testing of compacted soil
3. Inspection of site preparation operations
4. Inspection of footing excavations

#### 1.02 TESTING LABORATORY

##### A. As approved by Owner.

##### B. Requests for testing services: Scheduled and paid for by contractor.

##### C. Qualifications:

1. Independent testing laboratory qualified in soil testing and geotechnical engineering.
2. Testing and inspection: By competent soils engineering technicians and/or soils engineers whose work is directed and reviewed by geotechnical engineer registered in the State of Florida.

##### D. Duties:

1. Perform all work specified herein.
2. Perform testing in strict accordance with specified ASTM and AASHTO test procedures calibrated testing equipment.
3. Perform inspections and special test procedures, when directed, in accordance with methods widely recognized in geotechnical engineering industry, and as approved by Architect/Engineer.
4. Testing laboratory and its representatives are not authorized to revoke, alter, relax, enlarge or release any requirement of contract documents, nor to approve or accept any portion of work.
5. Issue testing and inspection reports as directed by Owner.
6. Soil technician will provide field copy of test results to Job Superintendent prior to leaving job site each day.
7. Confirm compliance with requirements of soils report prepared for this project.



## **PART 2 – EXECUTION**

### **2.01 SAMPLING**

- A. Obtain representative bag samples of soil to be compacted and tested for in-place density at appropriate time during site work operations.
- B. Obtain and transport samples to testing laboratory for required laboratory tests well in advance of on-site compaction operations.

### **2.02 LABORATORY TESTING**

- A. Acceptance of testing of Fill:
  - 1. Test representative samples of proposed fill in laboratory to determine physical properties and acceptability for use as fill.
  - 2. Perform following tests on each sample of fill:
    - a. Gradation Test (required): Determine particle size distribution, in accordance with ASTM D 422 down through No. 40 sieve; determine percent by weight passing No. 200 sieve in accordance with ASTM D 1140.
    - b. Atterberg Limits (testing laboratory option): If soil sample appears to possess significant plasticity, determine its plastic limit, liquid limit and plasticity index in accordance with ASTM D 423 and D 424.
    - c. Organic Content (testing laboratory option): If soil sample appears to contain a significant amount of organic matter, determine organics content by Wet Combustion Method, AASHTO T 194, or the Dry Combustion method (alcohol burning or muffle furnace method).
  - 3. Issue test report containing test results and opinion statement for each sample or proposed fill, as to acceptability or unacceptability for use as structural fill.
  - 4. Observe placement of fill material to verify conformance of lift heights and compaction procedures with project's soils report.
- B. Compaction Standards: Determine moisture-density relationship in accordance with ASTM D 157, Modified Proctor Method, of each sample of acceptable fill soil and on-site soil to be tested for in-place density.

### **2.03 SOIL DENSITY TESTS**

- A. Test Methods: Perform in-place density tests in compacted soil to determine compliance with compaction requirements cited in pertinent project specification sections.

Following test methods are acceptable:

- 1. Nuclear Method (preferred) ASTM D2922
- 2. Drive-Cylinder Method, ASTM D2937

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3. Sandcone Method, ASTM D1556
- B. Location and Frequency: Perform in-place soil density tests at frequency of not less than the following unless otherwise determined by Architect during course of work or as amended by the geotechnical engineers report.
1. Proofrolled Existing Soil: One test per each 5,000 square feet in building and paved areas. Test to depth of at least 12 inches.
  2. Structural Fill (Building Areas): One test per each 5,000 square feet per each 12 inch lift.
  3. Footings in Fill:
    - a. One test in 50% of isolated column footings.
    - b. One test per each 75 lineal feet of continuous wall footing.
  4. Trench and wall backfill: One test per each 75 lineal feet per each 12 inch lift.
- C. Retests:
1. Identify areas represented by failing soil density tests to Contractor.
  2. After designated area has been recompacted, retest area at locations selected by testing laboratory on random basis.
  3. Clearly label all tests on test reports and specifically note questionable area or areas.
  4. Communicate all failing test results and all retest results to contractor and architect within 24 hours.
- D. Test Reports:
1. Number in-place soil density tests sequentially with exception or retests.
  2. Number retests with original test number followed by letter (i.e., Test No. 16A means first test, etc.)
  3. Referenced vertical location of tests to elevation datum or to depth below finished subgrade.

## 2.04 SITEWORK INSPECTION

- A. Stripping and Grubbing:
1. Inspect areas to assure proper stripping depth has been achieved and objectionable organics have been removed.
  2. Define areas requiring additional work.
- B. Proofrolling and Removal of Unsuitable Material:
1. Witness specified proofrolling of existing soil exposed by stripping operations to determine presence of soils that are excessively soft or are unsuitable.
  2. Define areas which require undercutting and determine appropriate excavation depth.

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- C. Consolidation of Existing Soil: Witness specified compaction operations to assure that specified compaction equipment is in use and that specified number of passes has been achieved.

2.05 FOOTING INSPECTION

- A. Verification of Soil Type: Inspect bearing elevations of soil-support footings to assure that soil type and relative, in-place density compares with boring log data upon which design bearing pressure was based.
- B. If unacceptable soft or dissimilar soils are encountered, advise Architect promptly.

2.06 SOILS REPORT CONFORMANCE

- A. Verification of compliance with all site preparation requirements outlined report of geotechnical exploration included within the bid/contract documents.

END OF SECTION 311100

## **SECTION 313116 - TERMITE CONTROL**

### **PART 1 - GENERAL**

#### **1.1 SUMMARY**

- A. This Section includes the following:
  - 1. Soil treatment with termiticide.

#### **1.2 SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the EPA-Registered Label.
- B. Product certificates.
- C. Soil Treatment Application Report: Include the following:
  - 1. Date and time of application.
  - 2. Moisture content of soil before application.
  - 3. Brand name and manufacturer of termiticide.
  - 4. Quantity of undiluted termiticide used.
  - 5. Dilutions, methods, volumes, and rates of application used.
  - 6. Areas of application.
  - 7. Water source for application.

#### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.
- B. Regulatory Requirements: Formulate and apply termiticides according to the EPA-Registered Label.

#### **1.4 WARRANTY**

- A. Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
  - 1. Warranty Period: Three years from date of Substantial Completion.

1.5 MAINTENANCE SERVICE

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Termiticides:
    - a. Aventis Environmental Science USA LP; Termidor.
    - b. Bayer Corporation; Premise 75.
    - c. Dow AgroSciences LLC; Dursban TC.
    - d. FMC Corporation, Agricultural Products Group; Talstar.
    - e. Syngenta; Demon TC.
    - f. FMC Corporation, Agricultural Products Group; First Line Systems.
    - g. <Insert manufacturer's name; product name or designation.>

2.2 SOIL TREATMENT

- A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.

**PART 3 - EXECUTION**

3.1 PREPARATION

- A. General: Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.
- B. Soil Treatment Preparation: Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.

3.2 APPLYING SOIL TREATMENT

- A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the

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following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.

1. Slabs-on-Grade and Basement Slabs: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
  2. Foundations: Adjacent soil including soil along the entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating the slab, and around interior column footers, piers, and chimney bases; also along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
  3. Crawlspace: Soil under and adjacent to foundations as previously indicated. Treat adjacent areas including around entrance platform, porches, and equipment bases. Apply overall treatment only where attached concrete platform and porches are on fill or ground.
  4. Masonry: Treat voids.
  5. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.
- B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.
- C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.
- D. Post warning signs in areas of application.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

## **SECTION 321400 - UNIT PAVERS**

### **GENERAL**

#### 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Concrete pavers set in aggregate setting bed.

#### 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Samples: Showing the full range of colors, textures, and patterns available for each type of unit paver indicated.
  - 1. Include Samples of material for joints and accessories involving color selection.

#### 1.3 QUALITY ASSURANCE

- A. Build mockups for each form and pattern of unit paver.
  - 1. Build mockups 10'-0" x 10'-0".

#### 1.4 PROJECT CONDITIONS

- A. Cold-Weather Protection: Do not use frozen materials or build on frozen sub-grade or setting beds.

### **PART 2 - PRODUCTS**

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
  - 1. Manufacturer: Provide product by the manufacturer indicated on the Drawings.

#### 2.2 COLORS AND TEXTURES

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- A. Colors and Textures: As specified or indicated.
- B. Concrete Pavers: Solid, paving units, ASTM C 936, made from normal-weight aggregates in sizes and shapes indicated.
  - 1. Manufacturers:
    - a. As indicated on the drawings.
  - 2. Types:
    - a. As indicated on the drawings.

2.3 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Base: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- B. Sand for Leveling Course: Sound, sharp, washed sand complying with gradation requirements of ASTM C 33 for fine aggregate.
- C. Sand for Joints: Sharp, washed sand with 100 percent passing No. 16 (1.18-mm) sieve.

2.4 MORTAR SETTING – BED MATERIALS

- A. Portland Cement: ASTM C150, Type I or II
- B. Hydrated Lime: ASTM C207, types
- C. Sand: ASTM C144
- D. Latex Additive: water emulsion, serving as a replacement for part or all of a gaging water of type specially recommended by manufacturer for use with field-mixed Portland Cement mortar bed, and not containing a retarder.
- E. Water: Potable

**PART 3 - EXECUTION**

3.1 INSTALLATION, GENERAL

- A. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
- B. Cut unit pavers with motor-driven masonry saw to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.
  - 1. For concrete pavers, a block splitter may be used.



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- C. Joint Pattern: As indicated on drawings.
- D. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope.
- E. Provide suitable edge restraints. Install edge restraints before placing unit pavers.

3.2 AGGREGATE SETTING-BED PAVER APPLICATIONS (Inter-Locking Pavers)

- A. Compact soil sub-grade uniformly to at least 95 percent of ASTM D 1557 laboratory density.
- B. Proof-roll prepared sub-grade and correct deficient areas.
- C. Place aggregate base in thickness recommended. Compact by tamping with plate vibrator.
- D. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.
- E. Treat leveling base with soil sterilizer to inhibit growth of grass and weeds.
- F. Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars.
- G. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a 3500 - to 5000-lbf compaction force at 80 to 90 Hz.
- H. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Apply sandlock. Leave a slight surplus of sand on the surface for joint filling.

3.3 MORTAR SETTING-BED APPLICATIONS

- A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove service water about one hour before placing setting bed.
- B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing setting bed. Limit area bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16 inch thickness for bond coat.
- C. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed to subgrade elevations required for accurate setting of pavers to finished grades indicated.
- D. Mix and place only that amount of mortar that can be covered with pavers before initial set. Cut back and discard setting-bed material that has reached initial set before placing pavers.

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- E. Wet brick pavers before laying in the initial rate of absorption exceeds 30g/30 sq. in. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
- F. Place pavers before initial set of cement occurs. Immediately before placing pavers, apply uniform 1/16 inch thick, slurry bond coat to bed or to back of each paver.
- G. Tamp or beat pavers with wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicate tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
- H. Spaced Joint Widths: Provide 3/8-inch 1/2-inch 3/4-inch normal joint width with variations not exceeding plus or minus 1/16-inch 1/8-inch 3/16-inch.
- I. Grout joints as soon as possible after initial set of setting bed.
  - 1. Force grout into joints, taking care not to smear grout on adjoining surfaces.
  - 2. Tool exposed joints slightly concave when thumbprint hard.
- J. Cure grout by maintaining in a damp condition for seven days, unless otherwise recommended by grout or liquid-latex manufacturer.
- K. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
  - 1. Remove temporary protective coating from brick pavers as recommended by protective coating manufacturer and as acceptable to unit paver and grout manufacturer. Trap and remove coating to prevent it from clogging drains.

END OF SECTION 321400