

JCDM

DESIGN/BUILD

ARCHITECT



*Pathways United Methodist Church*

*Oronogo, Missouri*

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# PROJECT MANUAL

for

## PATHWAYS UNITED METHODIST CHURCH

23895 STATE HIGHWAY 96  
ORONOGO, MISSOURI 64855

### NEW BUILDING

NOVEMBER 11, 2010

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#### Architect

#### **Joplin Construction Design & Management, Inc.**

610 S Wall Ave  
Joplin, Missouri  
Tel. 417-781-4288

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#### Structural Engineer

**Thomas Edelman**  
5820 Village Lane  
Springfield, MO 65809  
Tel. 417-882-9850

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#### Mechanical/Electrical Engineer

#### **MALONE FINKLE ECKHARDT & COLLINS, INC**

2040 East Sunshine  
Springfield, MO 65804  
Tel. 417-881-0020

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#### Design / Builder

#### **Joplin Construction Design & Management, Inc.**

610 Wall Street/ PO Box 1604  
Joplin, MO 64801  
Tel No.: 417-781-4288  
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00100

## INVITATION TO BID

## PART 1

## 1.1 GENERAL

- A. The Owner: PATHWAYS UNITED METHODIST CHURCH  
23895 State Highway 96  
Oronogo, Missouri 64855
- B. The Project: New Building  
23895 State Highway 96  
Oronogo, Missouri 64855
- C. The Architect: Joplin Construction Design & Management, Inc  
610 South Wall Street  
Joplin, MO 64801  
Tel No: (417) 781-4288 Fax: (417) 781-4480  
email: [build@jcdm.com](mailto:build@jcdm.com)
- D. The Design/Builder Joplin Construction Design & Management, Inc.  
610 South Wall Street  
Joplin, MO 64801  
Tel No: (417) 781-4288 Fax: (417) 781-4480  
email: [build@jcdm.com](mailto:build@jcdm.com)
- E. General Description: New Building
- F. Bid Date and Location: To be Determined and Posted at a later date.
- Joplin Construction Design & Management, Inc.  
610 South Wall Street/PO Box 1604  
Joplin, Missouri 64801  
Tel No: (417) 781-4288  
Fax: (417) 781-4480
- G. Bid Opening: Subcontractor and Material Supplier bids will be opened in private.  
Apparent successful bidder will be contacted as soon as possible.
- H. Bidding Documents:
1. Bidding Documents will be on file and may be examined in the following locations:  
  
Joplin Construction Design & Management  
610 South Wall Street/ PO Box 1604  
Joplin, Missouri 64801  
Tel No: (417) 781-4288
  2. Bidding Document copies may be downloaded off the Internet at the following locations:  
  
[www.joplinconstruction.com](http://www.joplinconstruction.com)  
[www.jcdm.com](http://www.jcdm.com)- and click on Plan Room Online link.
  3. Bidding Documents may be obtained and examined: TBD

Joplin Construction Design & Management  
610 Wall Street/PO Box 1604  
Joplin, MO 64801  
Tel No: (417) 781-4288

4. Subcontractor Bidders may obtain full sets of Bid Documents can be obtained upon receipt of a refundable deposit, in the amount of \$50.00 per set.
  - a. Make checks payable to Joplin Construction Design & Management.
  - b. Bidding documents will be mailed or shipped via UPS at Bidder's expense.
  - c. Deposit will ONLY be refunded if Bid Documents are returned complete and undamaged, within 15 days following the bid closing date & bonafied bid was submitted.
6. Bid Security: Bid Security is not required.
7. Bid Irregularities: The Owner reserves the right to reject any or all bids and to waive any informality or irregularities in any Bid received.
8. Bid Irrevocability: Bids may not be withdrawn for a period of forty-five (45) calendar days from the date of the bid opening.

Part 2  
NOT APPLICABLE

Part 3  
NOT APPLICABLE

END OF DOCUMENT

## DOCUMENT 00200

## INSTRUCTIONS TO BIDDERS

## PART 1

## 1.1 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as:

Project: Pathways United Methodist Church  
 New Building,  
 23895 State Highway 96  
 Oronogo, Missouri 64855

As prepared by Architect:

Joplin Construction Design & Management  
 610 South Wall Street  
 Joplin, Missouri 64801  
 Tel No: 417-781-4288  
 Fax: 417-781-4480

## 1.2 BID SUBMISSION

- A. Bid Proposals, addressed to the Design/Builder, signed, executed, and dated will be received by the Design/Builder, at times determined and set by Project Manager

Design/Builder: Joplin Construction Design & Management  
 610 South Wall Street  
 Joplin, Missouri 64801  
 Tel No: 417-781-4288, Fax: 417-781-4480

- B. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and sealed the offer.  
 C. No bids received after the time fixed for receiving them will be considered.

## 1.3 INTENT

- A. The intent of this bid call is to obtain offers to perform work for the construction of a New Building for Pathways United Methodist Church located in Oronogo, Missouri for Stipulated Sum contracts, in accordance with the Contract Documents.  
 B. The work will be executed by multiple prime contractors, hourly day labor, and unit or negotiated costs.  
 C. Bids will be accepted in accordance with the several prime contract categories scheduled in Division 01100-Summary of Work.  
 D. Bidders may bid on more than one category, but each category shall be bid separately.  
 E. The Work will be coordinated and managed for the Owner by the Design/Builder.

## 1.4 CONSTRUCTION MANAGEMENT

- A. The Owner has awarded a Design / Build contract to:  
 Joplin Construction Design & Management Inc.  
 610 South Wall Street / PO Box 1604  
 Joplin, Missouri 64801  
 Tel No: 417-781-4288 Fax: 417-781-4480  
 B. The Design/Builder will coordinate and schedule the work for the various Sub-Contractors.

## 1.5 CONTRACT TIME

- A. Identify Contract Time in the Bid Form. The completion date in the Agreement shall be the Contract Time added to the commencement date.

END OF SECTION



DOCUMENT 00410

BID FORM

Date: \_\_\_\_\_

To: Joplin Construction Design & Management  
610 South Wall Street. PO Box 1604  
Joplin, Missouri 64801  
Tel No: 417-781-4288  
Fax: 417-781-4480

Project: Pathways United Methodist Church  
New Building,  
23895 State Highway 96  
Oronogo, Missouri 64855

Submitted by:  
(Official Business name and address)

.....  
.....  
.....

1. OFFER

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders, Bid Documents and Contract Documents prepared **Joplin Construction Design & Management**, for the above mentioned project, we the undersigned, hereby offer to enter into a Contract to perform the Work of:  
(Describe work & Specification Sections included): .....

.....

.....For

the Contract Sum of:

\$ ..... Dollars, in lawful money of the United States of America.

All applicable taxes are included in the Bid Sum.

2. ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for 45 days from the bid closing date.

If this bid is accepted by the Design/Builder within the time period stated above, we will:

- a. Execute the Agreement within seven days of receipt of agreement form from the Owner.
- b. Furnish the Certificates of Insurance required by the Supplementary Conditions, within ten days of receipt of Notice of Award.
- c. Furnish if required the required bonds within ten days of receipt of Notice of Award in the form described in Section 00600-Construction Bonds.
- d. Commence work within seven days after receipt of written Notice to Proceed.
- e. Agree to pay the difference between our bid and the next highest bid upon which a contract was signed as damages to the owner for failure to comply with this bid agreement.

**3. CONTRACT TIME**

If this bid is if accepted, we will: Complete the Work in ( ) calendar days from Notice to Proceed.

**4. OVERHEAD AND PROFIT**

The following percentages will be used to determine the dollar amounts for overhead and profit, to be added to the contractor's costs for changes in the Work ordered by the Owner:

For Work performed by Contractor's own forces: Overhead: \_\_\_\_\_ percent  
Profit: \_\_\_\_\_ percent

For Work performed by subcontractor, supervised by Contractor: Overhead: \_\_\_\_\_ percent  
Profit: \_\_\_\_\_ percent

**5. ADDENDA**

The following Addenda have been received. The modifications to the Contract Documents noted therein have been considered and all costs thereto are included in the Bid Sum.

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

**6. UNIT PRICES**

a. Unit Price (Cubic Yard) for Rock Excavation .....\$ \_\_\_\_\_

**7. BID FORM SIGNATURE(S)**

Official Name and Address of Company

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone No: \_\_\_\_\_

Fax. No. \_\_\_\_\_

Signed by: (Print) \_\_\_\_\_

Signature: \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

END OF DOCUMENT 00410

DOCUMENT 00520

FORM OF AGREEMENT

The Agreement shall be the Standard Form of Agreement Between Contractor and Sub-Contractor, AIA Document A401, 1997 Edition, a copy of which is on file and may be examined at the office of the Construction Manager and which, when executed, will become a part of the Contract Documents of the successful bidder.

END OF DOCUMENT





**AIA DOCUMENT A201-1997***General Conditions of the Contract for Construction***TABLE OF ARTICLES**

1. GENERAL PROVISIONS
2. OWNER
3. CONTRACTOR
4. ADMINISTRATION OF THE CONTRACT
5. SUBCONTRACTORS
6. CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
7. CHANGES IN THE WORK
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9. PAYMENTS AND COMPLETION
10. PROTECTION OF PERSONS AND PROPERTY
11. INSURANCE AND BONDS
12. UNCOVERING AND CORRECTION OF WORK
13. MISCELLANEOUS PROVISIONS
14. TERMINATION OR SUSPENSION OF THE CONTRACT

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This document has been approved and endorsed by The Associated General Contractors of America.



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**AIA DOCUMENT A201-1997**  
 GENERAL CONDITIONS  
 OF THE CONTRACT FOR  
 CONSTRUCTION

The American Institute  
 of Architects  
 1735 New York Avenue, N.W.  
 Washington, D.C. 20006-5292

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## ARTICLE 1 GENERAL PROVISIONS

### 1.1 BASIC DEFINITIONS

#### 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents consist of the Agreement between Owner and Contractor (hereinafter the Agreement), Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include other documents such as bidding requirements (advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or portions of Addenda relating to bidding requirements).

#### 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Architect and Contractor, (2) between the Owner and a Subcontractor or Sub-subcontractor, (3) between the Owner and Architect or (4) between any persons or entities other than the Owner and Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner or by separate contractors.

#### 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

#### 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### 1.1.7 THE PROJECT MANUAL

The Project Manual is a volume assembled for the Work which may include the bidding requirements, sample forms, Conditions of the Contract and Specifications.

### 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are



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complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

**1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

**1.2.3** Unless otherwise stated in the Contract Documents, words which have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### **1.3 CAPITALIZATION**

**1.3.1** Terms capitalized in these General Conditions include those which are (1) specifically defined, (2) the titles of numbered articles and identified references to Paragraphs, Subparagraphs and Clauses in the document or (3) the titles of other documents published by the American Institute of Architects.

### **1.4 INTERPRETATION**

**1.4.1** In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### **1.5 EXECUTION OF CONTRACT DOCUMENTS**

**1.5.1** The Contract Documents shall be signed by the Owner and Contractor. If either the Owner or Contractor or both do not sign all the Contract Documents, the Architect shall identify such unsigned Documents upon request.

**1.5.2** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

### **1.6 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE**

**1.6.1** The Drawings, Specifications and other documents, including those in electronic form, prepared by the Architect and the Architect's consultants are Instruments of Service through which the Work to be executed by the Contractor is described. The Contractor may retain one record set. Neither the Contractor nor any Subcontractor, Sub-subcontractor or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications and other documents prepared by the Architect or the Architect's consultants, and unless otherwise indicated the Architect and the Architect's consultants shall be deemed the authors of them and will retain all common law, statutory and other reserved rights, in addition to the copyrights. All copies of Instruments of Service, except the Contractor's record set, shall be returned or suitably accounted for to the Architect, on request, upon completion of the Work. The Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants, and copies thereof furnished to the Contractor, are for use solely with respect to this Project. They are not to be used by the Contractor or any Subcontractor, Sub-subcontractor or material or equipment supplier on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants. The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce applicable portions of the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants appropriate to and for use in



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the execution of their Work under the Contract Documents. All copies made under this authorization shall bear the statutory copyright notice, if any, shown on the Drawings, Specifications and other documents prepared by the Architect and the Architect's consultants. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' copyrights or other reserved rights.

## **ARTICLE 2 OWNER**

### **2.1 GENERAL**

**2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Subparagraph 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

**2.1.2** The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### **2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER**

**2.2.1** The Owner shall, at the written request of the Contractor, prior to commencement of the Work and thereafter, furnish to the Contractor reasonable evidence that financial arrangements have been made to fulfill the Owner's obligations under the Contract. Furnishing of such evidence shall be a condition precedent to commencement or continuation of the Work. After such evidence has been furnished, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**2.2.2** Except for permits and fees, including those required under Subparagraph 3.7.1, which are the responsibility of the Contractor under the Contract Documents, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**2.2.3** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**2.2.4** Information or services required of the Owner by the Contract Documents shall be furnished by the Owner with reasonable promptness. Any other information or services relevant to the Contractor's performance of the Work under the Owner's control shall be furnished by the Owner after receipt from the Contractor of a written request for such information or services.

**2.2.5** Unless otherwise provided in the Contract Documents, the Contractor will be furnished, free of charge, such copies of Drawings and Project Manuals as are reasonably necessary for execution of the Work.

### **2.3 OWNER'S RIGHT TO STOP THE WORK**

**2.3.1** If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Paragraph 12.2 or persistently fails to carry out Work in



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accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Subparagraph 6.1.3.

#### **2.4 OWNER'S RIGHT TO CARRY OUT THE WORK**

**2.4.1** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a seven-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may after such seven-day period give the Contractor a second written notice to correct such deficiencies within a three-day period. If the Contractor within such three-day period after receipt of such second notice fails to commence and continue to correct any deficiencies, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

### **ARTICLE 3 CONTRACTOR**

#### **3.1 GENERAL**

**3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**3.1.3** The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons other than the Contractor.

#### **3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

**3.2.1** Since the Contract Documents are complementary, before starting each portion of the Work, the Contractor shall carefully study and compare the various Drawings and other Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Subparagraph 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, any errors, inconsistencies or omissions discovered by the Contractor shall be reported promptly to the Architect as a request for information in such form as the Architect may require.

**3.2.2** Any design errors or omissions noted by the Contractor during this review shall be reported promptly to the Architect, but it is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional unless otherwise specifically provided in the Contract Documents. The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations, but any nonconformity discovered by or made known to the Contractor shall be reported promptly to the Architect.



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**3.2.3** If the Contractor believes that additional cost or time is involved because of clarifications or instructions issued by the Architect in response to the Contractor's notices or requests for information pursuant to Subparagraphs 3.2.1 and 3.2.2, the Contractor shall make Claims as provided in Subparagraphs 4.3.6 and 4.3.7. If the Contractor fails to perform the obligations of Subparagraphs 3.2.1 and 3.2.2, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. The Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents or for differences between field measurements or conditions and the Contract Documents unless the Contractor recognized such error, inconsistency, omission or difference and knowingly failed to report it to the Architect.

### **3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

**3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for and have control over construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any resulting loss or damage.

**3.3.2** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for or on behalf of the Contractor or any of its Subcontractors.

**3.3.3** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

### **3.4 LABOR AND MATERIALS**

**3.4.1** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

**3.4.2** The Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order.

**3.4.3** The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Contract. The Contractor shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

### **3.5 WARRANTY**

**3.5.1** The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the Work will be free from defects not inherent in the quality required or permitted, and that the Work will conform to the requirements of the Contract



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Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, modifications not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

**3.6 TAXES**

**3.6.1** The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor which are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

**3.7 PERMITS, FEES AND NOTICES**

**3.7.1** Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses and inspections necessary for proper execution and completion of the Work which are customarily secured after execution of the Contract and which are legally required when bids are received or negotiations concluded.

**3.7.2** The Contractor shall comply with and give notices required by laws, ordinances, rules, regulations and lawful orders of public authorities applicable to performance of the Work.

**3.7.3** It is not the Contractor's responsibility to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, building codes, and rules and regulations. However, if the Contractor observes that portions of the Contract Documents are at variance therewith, the Contractor shall promptly notify the Architect and Owner in writing, and necessary changes shall be accomplished by appropriate Modification.

**3.7.4** If the Contractor performs Work knowing it to be contrary to laws, statutes, ordinances, building codes, and rules and regulations without such notice to the Architect and Owner, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

**3.8 ALLOWANCES**

**3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**3.8.2** Unless otherwise provided in the Contract Documents:

- 1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- 2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances;
- 3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Clause 3.8.2.1 and (2) changes in Contractor's costs under Clause 3.8.2.2.

**3.8.3** Materials and equipment under an allowance shall be selected by the Owner in sufficient time to avoid delay in the Work.



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### **3.9 SUPERINTENDENT**

**3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor. Important communications shall be confirmed in writing. Other communications shall be similarly confirmed on written request in each case.

### **3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES**

**3.10.1** The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

**3.10.2** The Contractor shall prepare and keep current, for the Architect's approval, a schedule of submittals which is coordinated with the Contractor's construction schedule and allows the Architect reasonable time to review submittals.

**3.10.3** The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### **3.11 DOCUMENTS AND SAMPLES AT THE SITE**

**3.11.1** The Contractor shall maintain at the site for the Owner one record copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to record field changes and selections made during construction, and one record copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work.

### **3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES**

**3.12.1** Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

**3.12.2** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**3.12.3** Samples are physical examples which illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

**3.12.4** Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. The purpose of their submittal is to demonstrate for those portions of the Work for which submittals are required by the Contract Documents the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents. Review by the Architect is subject to the limitations of Subparagraph 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals which are not required by the Contract Documents may be returned by the Architect without action.

**3.12.5** The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by



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the Contract Documents with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors. Submittals which are not marked as reviewed for compliance with the Contract Documents and approved by the Contractor may be returned by the Architect without action.

**3.12.6** By approving and submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents that the Contractor has determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

**3.12.8** The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

**3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice the Architect's approval of a resubmission shall not apply to such revisions.

**3.12.10** The Contractor shall not be required to provide professional services which constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications or approvals performed by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Subparagraph 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance or design criteria required by the Contract Documents.



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### **3.13 USE OF SITE**

**3.13.1** The Contractor shall confine operations at the site to areas permitted by law, ordinances, permits and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **3.14 CUTTING AND PATCHING**

**3.14.1** The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly.

**3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

### **3.15 CLEANING UP**

**3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove from and about the Project waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials.

**3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the cost thereof shall be charged to the Contractor.

### **3.16 ACCESS TO WORK**

**3.16.1** The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

### **3.17 ROYALTIES, PATENTS AND COPYRIGHTS**

**3.17.1** The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

### **3.18 INDEMNIFICATION**

**3.18.1** To the fullest extent permitted by law and to the extent claims, damages, losses or expenses are not covered by Project Management Protective Liability insurance purchased by the Contractor in accordance with Paragraph 11.3, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be



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construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Paragraph 3.18.

**3.18.2** In claims against any person or entity indemnified under this Paragraph 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Subparagraph 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts; disability benefit acts or other employee benefit acts.

#### **ARTICLE 4. ADMINISTRATION OF THE CONTRACT**

##### **4.1 ARCHITECT**

**4.1.1** The Architect is the person lawfully licensed to practice architecture or an entity lawfully practicing architecture identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The term "Architect" means the Architect or the Architect's authorized representative.

**4.1.2** Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

**4.1.3** If the employment of the Architect is terminated, the Owner shall employ a new Architect against whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the former Architect.

##### **4.2 ARCHITECT'S ADMINISTRATION OF THE CONTRACT**

**4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents, and will be an Owner's representative (1) during construction, (2) until final payment is due and (3) with the Owner's concurrence, from time to time during the one-year period for correction of Work described in Paragraph 12.2. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents, unless otherwise modified in writing in accordance with other provisions of the Contract.

**4.2.2** The Architect, as a representative of the Owner, will visit the site at intervals appropriate to the stage of the Contractor's operations (1) to become generally familiar with and to keep the Owner informed about the progress and quality of the portion of the Work completed, (2) to endeavor to guard the Owner against defects and deficiencies in the Work, and (3) to determine in general if the Work is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will neither have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Subparagraph 3.3.1.

**4.2.3** The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.



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**4.2.4 Communications Facilitating Contract Administration.** Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

**4.2.5** Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

**4.2.6** The Architect will have authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Subparagraphs 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

**4.2.7** The Architect will review and approve or take other appropriate action upon the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken with such reasonable promptness as to cause no delay in the Work or in the activities of the Owner, Contractor or separate contractors, while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Paragraphs 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

**4.2.8** The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Paragraph 7.4.

**4.2.9** The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion, will receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor, and will issue a final Certificate for Payment upon compliance with the requirements of the Contract Documents.

**4.2.10** If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

**4.2.11** The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor.



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The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If no agreement is made concerning the time within which interpretations required of the Architect shall be furnished in compliance with this Paragraph 4.2, then delay shall not be recognized on account of failure by the Architect to furnish such interpretations until 15 days after written request is made for them.

**4.2.12** Interpretations and decisions of the Architect will be consistent with the intent of and reasonably inferable from the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and initial decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions so rendered in good faith.

**4.2.13** The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

### **4.3 CLAIMS AND DISPUTES**

**4.3.1** **Definition.** A Claim is a demand or assertion by one of the parties seeking, as a matter of right, adjustment or interpretation of Contract terms, payment of money, extension of time or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. Claims must be initiated by written notice. The responsibility to substantiate Claims shall rest with the party making the Claim.

**4.3.2** **Time Limits on Claims.** Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later. Claims must be initiated by written notice to the Architect and the other party.

**4.3.3** **Continuing Contract Performance.** Pending final resolution of a Claim except as otherwise agreed in writing or as provided in Subparagraph 9.7.1 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

**4.3.4** **Claims for Concealed or Unknown Conditions.** If conditions are encountered at the site which are (1) subsurface or otherwise concealed physical conditions which differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, which differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, then notice by the observing party shall be given to the other party promptly before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall so notify the Owner and Contractor in writing, stating the reasons. Claims by either party in opposition to such determination must be made within 21 days after the Architect has given notice of the decision. If the conditions encountered are materially different, the Contract Sum and Contract Time shall be equitably adjusted, but if the Owner and Contractor cannot agree on an adjustment in the Contract Sum or Contract Time, the adjustment shall be referred to the Architect for initial determination, subject to further proceedings pursuant to Paragraph 4.4.



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**4.3.5 Claims for Additional Cost.** If the Contractor wishes to make Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Paragraph 10.6.

**4.3.6** If the Contractor believes additional cost is involved for reasons including but not limited to (1) a written interpretation from the Architect, (2) an order by the Owner to stop the Work where the Contractor was not at fault, (3) a written order for a minor change in the Work issued by the Architect, (4) failure of payment by the Owner, (5) termination of the Contract by the Owner, (6) Owner's suspension or (7) other reasonable grounds, Claim shall be filed in accordance with this Paragraph 4.3.

#### **4.3.7 CLAIMS FOR ADDITIONAL TIME**

**4.3.7.1** If the Contractor wishes to make Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay only one Claim is necessary.

**4.3.7.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

**4.3.8 Injury or Damage to Person or Property.** If either party to the Contract suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

**4.3.9** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

**4.3.10 Claims for Consequential Damages.** The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes:

- 1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- 2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Subparagraph 4.3.10 shall be deemed to preclude an award of liquidated direct damages, when applicable, in accordance with the requirements of the Contract Documents.

#### **4.4 RESOLUTION OF CLAIMS AND DISPUTES**

**4.4.1 Decision of Architect.** Claims, including those alleging an error or omission by the Architect but excluding those arising under Paragraphs 10.3 through 10.5, shall be referred initially to the Architect for decision. An initial decision by the Architect shall be required as a



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condition precedent to mediation, arbitration or litigation of all Claims between the Contractor and Owner arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Architect with no decision having been rendered by the Architect. The Architect will not decide disputes between the Contractor and persons or entities other than the Owner.

**4.4.2** The Architect will review Claims and within ten days of the receipt of the Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Architect is unable to resolve the Claim if the Architect lacks sufficient information to evaluate the merits of the Claim or if the Architect concludes that, in the Architect's sole discretion, it would be inappropriate for the Architect to resolve the Claim.

**4.4.3** In evaluating Claims, the Architect may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Architect in rendering a decision. The Architect may request the Owner to authorize retention of such persons at the Owner's expense.

**4.4.4** If the Architect requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either provide a response on the requested supporting data, advise the Architect when the response or supporting data will be furnished or advise the Architect that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Architect will either reject or approve the Claim in whole or in part.

**4.4.5** The Architect will approve or reject Claims by written decision, which shall state the reasons therefor and which shall notify the parties of any change in the Contract Sum or Contract Time or both. The approval or rejection of a Claim by the Architect shall be final and binding on the parties but subject to mediation and arbitration.

**4.4.6** When a written decision of the Architect states that (1) the decision is final but subject to mediation and arbitration and (2) a demand for arbitration of a Claim covered by such decision must be made within 30 days after the date on which the party making the demand receives the final written decision, then failure to demand arbitration within said 30 days' period shall result in the Architect's decision becoming final and binding upon the Owner and Contractor. If the Architect renders a decision after arbitration proceedings have been initiated, such decision may be entered as evidence, but shall not supersede arbitration proceedings unless the decision is acceptable to all parties concerned.

**4.4.7** Upon receipt of a Claim against the Contractor or at any time thereafter, the Architect or the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Architect or the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**4.4.8** If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the Claim by the Architect, by mediation or by arbitration.

#### **4.5 MEDIATION**

**4.5.1** Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Subparagraphs 4.3.10, 9.10.4 and 9.10.5 shall, after initial decision by the Architect or 30 days after submission of the Claim to the Architect, be



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subject to mediation as a condition precedent to arbitration or the institution of legal or equitable proceedings by either party.

**4.5.2** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect. Request for mediation shall be filed in writing with the other party to the Contract and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration but, in such event, mediation shall proceed in advance of arbitration or legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order.

**4.5.3** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

#### **4.6 ARBITRATION**

**4.6.1** Any Claim arising out of or related to the Contract, except Claims relating to aesthetic effect and except those waived as provided for in Subparagraphs 4.3.10, 9.10.4 and 9.10.5, shall, after decision by the Architect or 30 days after submission of the Claim to the Architect, be subject to arbitration. Prior to arbitration, the parties shall endeavor to resolve disputes by mediation in accordance with the provisions of Paragraph 4.5.

**4.6.2** Claims not resolved by mediation shall be decided by arbitration which, unless the parties mutually agree otherwise, shall be in accordance with the Construction Industry Arbitration Rules of the American Arbitration Association currently in effect. The demand for arbitration shall be filed in writing with the other party to the Contract and with the American Arbitration Association, and a copy shall be filed with the Architect.

**4.6.3** A demand for arbitration shall be made within the time limits specified in Subparagraphs 4.4.6 and 4.6.1 as applicable, and in other cases within a reasonable time after the Claim has arisen, and in no event shall it be made after the date when institution of legal or equitable proceedings based on such Claim would be barred by the applicable statute of limitations as determined pursuant to Paragraph 13.7.

**4.6.4 Limitation on Consolidation or Joinder.** No arbitration arising out of or relating to the Contract shall include, by consolidation or joinder or in any other manner, the Architect, the Architect's employees or consultants, except by written consent containing specific reference to the Agreement and signed by the Architect, Owner, Contractor and any other person or entity sought to be joined. No arbitration shall include, by consolidation or joinder or in any other manner, parties other than the Owner, Contractor, a separate contractor as described in Article 6 and other persons substantially involved in a common question of fact or law whose presence is required if complete relief is to be accorded in arbitration. No person or entity other than the Owner, Contractor or a separate contractor as described in Article 6 shall be included as an original third party or additional third party to an arbitration whose interest or responsibility is insubstantial. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of a Claim not described therein or with a person or entity not named or described therein. The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.



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**4.6.5 Claims and Timely Assertion of Claims.** The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

**4.6.6 Judgment on Final Award.** The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

## **ARTICLE 5 SUBCONTRACTORS**

### **5.1 DEFINITIONS**

**5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

**5.1.2** A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### **5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK**

**5.2.1** Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect will promptly reply to the Contractor in writing stating whether or not the Owner or the Architect, after due investigation, has reasonable objection to any such proposed person or entity. Failure of the Owner or Architect to reply promptly shall constitute notice of no reasonable objection.

**5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

**5.2.4** The Contractor shall not change a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitute.

### **5.3 SUBCONTRACTUAL RELATIONS**

**5.3.1** By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the



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Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement which may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

#### **5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS**

**5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner provided that:

- 1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Paragraph 14.2 and only for those subcontract agreements which the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- 2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

**5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

### **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

#### **6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS**

**6.1.1** The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Paragraph 4.3.

**6.1.2** When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**6.1.3** The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules when directed to do so. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

**6.1.4** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights which apply to the



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Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

## **6.2 MUTUAL RESPONSIBILITY**

**6.2.1** The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

**6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

**6.2.3** The Owner shall be reimbursed by the Contractor for costs incurred by the Owner which are payable to a separate contractor because of delays, improperly timed activities or defective construction of the Contractor. The Owner shall be responsible to the Contractor for costs incurred by the Contractor because of delays, improperly timed activities, damage to the Work or defective construction of a separate contractor.

**6.2.4** The Contractor shall promptly remedy damage wrongfully caused by the Contractor to completed or partially completed construction or to property of the Owner or separate contractors as provided in Subparagraph 10.2.5.

**6.2.5** The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Subparagraph 3.14.

## **6.3 OWNER'S RIGHT TO CLEAN UP**

**6.3.1** If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## **ARTICLE 7 CHANGES IN THE WORK**

### **7.1 GENERAL**

**7.1.1** Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

**7.1.2** A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

**7.1.3** Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.



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## 7.2 CHANGE ORDERS

7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect, stating their agreement upon all of the following:

- 1 change in the Work;
- 2 the amount of the adjustment, if any, in the Contract Sum; and
- 3 the extent of the adjustment, if any, in the Contract Time.

7.2.2 Methods used in determining adjustments to the Contract Sum may include those listed in Subparagraph 7.3.3.

## 7.3 CONSTRUCTION CHANGE DIRECTIVES

7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- 1 mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- 2 unit prices stated in the Contract Documents or subsequently agreed upon;
- 3 cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- 4 as provided in Subparagraph 7.3.6.

7.3.4 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

7.3.5 A Construction Change Directive signed by the Contractor indicates the agreement of the Contractor therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

7.3.6 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the method and the adjustment shall be determined by the Architect on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, a reasonable allowance for overhead and profit. In such case, and also under Clause 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Subparagraph 7.3.6 shall be limited to the following:

- 1 costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- 2 costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- 3 rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;



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- 4 costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- 5 additional costs of supervision and field office personnel directly attributable to the change.

7.3.7. The amount of credit to be allowed by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

7.3.8 Pending final determination of the total cost of a Construction Change Directive to the Owner, amounts not in dispute for such changes in the Work shall be included in Applications for Payment accompanied by a Change Order indicating the parties' agreement with part or all of such costs. For any portion of such cost that remains in dispute, the Architect will make an interim determination for purposes of monthly certification for payment for those costs. That determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a claim in accordance with Article 4.

7.3.9 When the Owner and Contractor agree with the determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order.

#### 7.4 MINOR CHANGES IN THE WORK

7.4.1 The Architect will have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes shall be effected by written order and shall be binding on the Owner and Contractor. The Contractor shall carry out such written orders promptly.

### ARTICLE 8 TIME

#### 8.1 DEFINITIONS

8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

8.1.2 The date of commencement of the Work is the date established in the Agreement.

8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Paragraph 9.8.

8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

#### 8.2 PROGRESS AND COMPLETION

8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance. Unless the date of commencement is established by the Contract Documents or a notice to proceed given



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by the Owner, the Contractor shall notify the Owner in writing not less than five days or other agreed period before commencing the Work to permit the timely filing of mortgages, mechanic's liens and other security interests.

**8.2.3** The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### **8.3 DELAYS AND EXTENSIONS OF TIME**

**8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner, or by changes ordered in the Work, or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control, or by delay authorized by the Owner pending mediation and arbitration, or by other causes which the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

**8.3.2** Claims relating to time shall be made in accordance with applicable provisions of Paragraph 4.3.

**8.3.3** This Paragraph 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **9.1 CONTRACT SUM**

**9.1.1** The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

### **9.2 SCHEDULE OF VALUES**

**9.2.1** Before the first Application for Payment, the Contractor shall submit to the Architect a schedule of values allocated to various portions of the Work, prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

### **9.3 APPLICATIONS FOR PAYMENT**

**9.3.1** At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for operations completed in accordance with the schedule of values. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and reflecting retainage if provided for in the Contract Documents.

**9.3.1.1** As provided in Subparagraph 7.3.8, such applications may include requests for payment on account of changes in the Work which have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

**9.3.1.2** Such applications may not include requests for payment for portions of the Work for which the Contractor does not intend to pay to a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.



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**9.3.2** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

**9.3.3** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

#### **9.4 CERTIFICATES FOR PAYMENT**

**9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Subparagraph 9.5.1.

**9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that the Work has progressed to the point indicated and that, to the best of the Architect's knowledge, information and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### **9.5 DECISIONS TO WITHHOLD CERTIFICATION**

**9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Subparagraph 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Subparagraph 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's



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opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Subparagraph 3.3.2, because of:

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or another contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 persistent failure to carry out the Work in accordance with the Contract Documents.

**9.5.2** When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

## **9.6 PROGRESS PAYMENTS**

**9.6.1** After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

**9.6.2** The Contractor shall promptly pay each Subcontractor, upon receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of such Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

**9.6.3** The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

**9.6.4** Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor except as may otherwise be required by law.

**9.6.5** Payment to material suppliers shall be treated in a manner similar to that provided in Subparagraphs 9.6.2, 9.6.3 and 9.6.4.

**9.6.6** A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**9.6.7** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.



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## **9.7 FAILURE OF PAYMENT**

**9.7.1** If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by arbitration, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

## **9.8 SUBSTANTIAL COMPLETION**

**9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion which shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

## **9.9 PARTIAL OCCUPANCY OR USE**

**9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Clause 11.4.1.5 and authorized by public authorities having jurisdiction over the Work. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and



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have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Subparagraph 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

#### **9.10 FINAL COMPLETION AND FINAL PAYMENT**

**9.10.1** Upon receipt of written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Subparagraph 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

**9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that



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portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

**9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from:

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

**9.10.5** Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **10.1 SAFETY PRECAUTIONS AND PROGRAMS**

**10.1.1** The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

### **10.2 SAFETY OF PERSONS AND PROPERTY**

**10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

**10.2.2** The Contractor shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

**10.2.3** The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

**10.2.4** When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

**10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Clauses 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Clauses 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Paragraph 3.18.



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**10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

**10.2.7** The Contractor shall not load or permit any part of the construction or site to be loaded so as to endanger its safety.

### **10.3 HAZARDOUS MATERIALS**

**10.3.1** If reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

**10.3.2** The Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to verify that it has been rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. The Contract Time shall be extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up, which adjustments shall be accomplished as provided in Article 7.

**10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Subparagraph 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself) and provided that such damage, loss or expense is not due to the sole negligence of a party seeking indemnity.

**10.4** The Owner shall not be responsible under Paragraph 10.3 for materials and substances brought to the site by the Contractor unless such materials or substances were required by the Contract Documents.

**10.5** If, without negligence on the part of the Contractor, the Contractor is held liable for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

### **10.6 EMERGENCIES**

**10.6.1** In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or



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extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Paragraph 4.3 and Article 7.

## ARTICLE 11 INSURANCE AND BONDS

### 11.1 CONTRACTOR'S LIABILITY INSURANCE

11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 claims under workers' compensation, disability benefit and other similar employee benefit acts which are applicable to the Work to be performed;
- .2 claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 claims for damages insured by usual personal injury liability coverage;
- .5 claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 claims for bodily injury or property damage arising out of completed operations; and
- .8 claims involving contractual liability insurance applicable to the Contractor's obligations under Paragraph 3.18.

11.1.2 The insurance required by Subparagraph 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from date of commencement of the Work until date of final payment and termination of any coverage required to be maintained after final payment.

11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work. These certificates and the insurance policies required by this Paragraph 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final Application for Payment as required by Subparagraph 9.10.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness in accordance with the Contractor's information and belief.

### 11.2 OWNER'S LIABILITY INSURANCE

11.2.1 The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

### 11.3 PROJECT MANAGEMENT PROTECTIVE LIABILITY INSURANCE

11.3.1 Optionally, the Owner may require the Contractor to purchase and maintain Project Management Protective Liability insurance from the Contractor's usual sources as primary coverage for the Owner's, Contractor's and Architect's vicarious liability for construction operations under the Contract. Unless otherwise required by the Contract Documents, the Owner



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shall reimburse the Contractor by increasing the Contract Sum to pay the cost of purchasing and maintaining such optional insurance coverage, and the Contractor shall not be responsible for purchasing any other liability insurance on behalf of the Owner. The minimum limits of liability purchased with such coverage shall be equal to the aggregate of the limits required for Contractor's Liability Insurance under Clauses 11.1.1.2 through 11.1.1.5.

**11.3.2** To the extent damages are covered by Project Management Protective Liability insurance, the Owner, Contractor and Architect waive all rights against each other for damages, except such rights as they may have to the proceeds of such insurance. The policy shall provide for such waivers of subrogation by endorsement or otherwise.

**11.3.3** The Owner shall not require the Contractor to include the Owner, Architect or other persons or entities as additional insureds on the Contractor's Liability Insurance coverage under Paragraph 11.1.

#### **11.4 PROPERTY INSURANCE**

**11.4.1** Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Paragraph 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Paragraph 11.4 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

**11.4.1.1** Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

**11.4.1.2** If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance which will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

**11.4.1.3** If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

**11.4.1.4** This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

**11.4.1.5** Partial occupancy or use in accordance with Paragraph 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial



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occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

**11.4.2 Boiler and Machinery Insurance.** The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

**11.4.3 Loss of Use Insurance.** The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

**11.4.4** If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

**11.4.5** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Subparagraph 11.4.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

**11.4.6** Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Paragraph 11.4. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

**11.4.7 Waivers of Subrogation.** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Paragraph 11.4 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.



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**11.4.8** A loss insured under Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Subparagraph 11.4.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

**11.4.9** If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or in accordance with an arbitration award in which case the procedure shall be as provided in Paragraph 4.6. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

**11.4.10** The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved as provided in Paragraphs 4.5 and 4.6. The Owner as fiduciary shall, in the case of arbitration, make settlement with insurers in accordance with directions of the arbitrators. If distribution of insurance proceeds by arbitration is required, the arbitrators will direct such distribution.

**11.5 PERFORMANCE BOND AND PAYMENT BOND**

**11.5.1** The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

**11.5.2** Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall permit a copy to be made.

**ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

**12.1 UNCOVERING OF WORK**

**12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if required in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**12.1.2** If a portion of the Work has been covered which the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.



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## **12.2 CORRECTION OF WORK**

### **12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION**

**12.2.1.1** The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

### **12.2.2 AFTER SUBSTANTIAL COMPLETION**

**12.2.2.1** In addition to the Contractor's obligations under Paragraph 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Subparagraph 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Paragraph 2.4.

**12.2.2.2** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work.

**12.2.2.3** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Paragraph 12.2.

**12.2.3** The Contractor shall remove from the site portions of the Work which are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

**12.2.4** The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work which is not in accordance with the requirements of the Contract Documents.

**12.2.5** Nothing contained in this Paragraph 12.2 shall be construed to establish a period of limitation with respect to other obligations which the Contractor might have under the Contract Documents. Establishment of the one-year period for correction of Work as described in Subparagraph 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

### **12.3 ACCEPTANCE OF NONCONFORMING WORK**

**12.3.1** If the Owner prefers to accept Work which is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.



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## ARTICLE 13 MISCELLANEOUS PROVISIONS

### 13.1 GOVERNING LAW

13.1.1 The Contract shall be governed by the law of the place where the Project is located.

### 13.2 SUCCESSORS AND ASSIGNS

13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Subparagraph 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

13.2.2 The Owner may, without consent of the Contractor, assign the Contract to an institutional lender providing construction financing for the Project. In such event, the lender shall assume the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

### 13.3 WRITTEN NOTICE

13.3.1 Written notice shall be deemed to have been duly served if delivered in person to the individual or a member of the firm or entity or to an officer of the corporation for which it was intended, or if delivered at or sent by registered or certified mail to the last business address known to the party giving notice.

### 13.4 RIGHTS AND REMEDIES

13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

### 13.5 TESTS AND INSPECTIONS

13.5.1 Tests, inspections and approvals of portions of the Work required by the Contract Documents or by laws, ordinances, rules, regulations or orders of public authorities having jurisdiction shall be made at an appropriate time. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections or approvals which do not become requirements until after bids are received or negotiations concluded.

13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Subparagraph 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Subparagraph 13.5.3, shall be at the Owner's expense.



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**13.5.3** If such procedures for testing, inspection or approval under Subparagraphs 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

**13.5.4** Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

**13.5.5** If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

**13.5.6** Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

### **13.6 INTEREST**

**13.6.1** Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

### **13.7 COMMENCEMENT OF STATUTORY LIMITATION PERIOD**

**13.7.1** As between the Owner and Contractor:

- 1 **Before Substantial Completion.** As to acts or failures to act occurring prior to the relevant date of Substantial Completion, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than such date of Substantial Completion;
- 2 **Between Substantial Completion and Final Certificate for Payment.** As to acts or failures to act occurring subsequent to the relevant date of Substantial Completion and prior to issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of issuance of the final Certificate for Payment; and
- 3 **After Final Certificate for Payment.** As to acts or failures to act occurring after the relevant date of issuance of the final Certificate for Payment, any applicable statute of limitations shall commence to run and any alleged cause of action shall be deemed to have accrued in any and all events not later than the date of any act or failure to act by the Contractor pursuant to any Warranty provided under Paragraph 3.5, the date of any correction of the Work or failure to correct the Work by the Contractor under Paragraph 12.2, or the date of actual commission of any other act or failure to perform any duty or obligation by the Contractor or Owner, whichever occurs last.

## **ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT**

### **14.1 TERMINATION BY THE CONTRACTOR**

**14.1.1** The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- 1 issuance of an order of a court or other public authority having jurisdiction which requires all Work to be stopped;
- 2 an act of government, such as a declaration of national emergency which requires all Work to be stopped;



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- 3 because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Subparagraph 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- 4 the Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Subparagraph 2.2.1.

**14.1.2** The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Paragraph 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

**14.1.3** If one of the reasons described in Subparagraph 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and for proven loss with respect to materials, equipment, tools, and construction equipment and machinery, including reasonable overhead, profit and damages.

**14.1.4** If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has persistently failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Subparagraph 14.1.3.

## **14.2 TERMINATION BY THE OWNER FOR CAUSE**

**14.2.1** The Owner may terminate the Contract if the Contractor:

- 1 persistently or repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- 2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- 3 persistently disregards laws, ordinances, or rules, regulations or orders of a public authority having jurisdiction; or
- 4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

**14.2.2** When any of the above reasons exist, the Owner, upon certification by the Architect that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- 1 take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- 2 accept assignment of subcontracts pursuant to Paragraph 5.4; and
- 3 finish the Work by whatever reasonable method the Owner may deem expedient. Upon request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

**14.2.3** When the Owner terminates the Contract for one of the reasons stated in Subparagraph 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.



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**14.2.4** If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Architect, upon application, and this obligation for payment shall survive termination of the Contract.

**14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE**

**14.3.1** The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

**14.3.2** The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Subparagraph 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent:

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

**14.4 TERMINATION BY THE OWNER FOR CONVENIENCE**

**14.4.1** The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

**14.4.2** Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall:

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**14.4.3** In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.



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## DOCUMENT 00811

## SUPPLEMENTARY CONDITIONS

## PART 1

## 1.1 SUPPLEMENTARY CONDITIONS

- A. These Supplementary Conditions amend or supplement the General Conditions of the Contract for Construction AIA A201, 1997 Edition and other provisions of the Contract Documents as indicated below. All provisions which are not so amended or supplemented remain in full force and effect.
- B. The terms used in these Supplementary Conditions which are defined in the General Conditions of the Contract for Construction, AIA A201, 1997 Edition have the meanings assigned to them in the General Conditions.
- C. The General Conditions also may be supplemented elsewhere in the Contract documents by provisions located in, but not necessarily limited to, Division 1 of the Specifications.

## 1.2 AMENDMENTS TO ARTICLE 1 GENERAL PROVISIONS

- A. Add Paragraph 1.7 and Subparagraphs as follows:
  - 1.7 DEFINITIONS
    - 1. Products:
      - a. Means new material, machinery, components, equipment, fixtures, and systems forming the Work, but does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work
      - b. Products may also include existing materials or components required for reuse.
    - 2. Furnish or supply:
      - a. To supply and deliver, unload, inspect for damage.
    - 3. Install:
      - b. To unpack, assemble, erect, apply, place, finish, cure, protect, clean, and ready for use.
    - 4. Provide
      - a. To furnish or supply, plus install.
    - 5. Building Code:
      - a. Refer to regulations of governmental agencies having jurisdiction.
    - 6. Approved, Required, and As Directed:
      - a. Refer to and indicate the work or materials that may be approved, required, or directed by the Architect acting as the agent of the Owner.
    - 7. Similar:
      - a. Means in general sense and not necessarily identical.
    - 8. Shown, Indicated, Detailed, Noted, And Scheduled:
      - a. Refer to requirements contained in the Contract Documents.

## 1.3 AMENDMENTS TO ARTICLE 2 OWNER

- A. Delete subparagraph 2.2.5 and substitute the following:
  - 1. 2.2.5 The Contractor will be furnished, free of charge, 1 copy of the Drawings and Project Manual, except that shipping charges will be paid by the Contractor. Additional sets will be furnished at the cost of reproduction, shipping and handling.

## 1.4 AMENDMENTS TO ARTICLE 3 CONTRACTOR

- A. At paragraph 3.4 Labor and Materials, add subparagraphs as follows:
  - 1. 3.4.4 After the Contract has been executed, the Owner and the Architect will consider a formal request for the substitution of products in place of those specified only under the conditions set forth in Section 01600 Products and Equipment.
  - 2. 3.4.5 By making requests for substitution based on Subparagraph 3.4.5 above, the Contractor:
    - a. represents that the contractor has personally investigated the proposed substitute product and determined that is equal or superior in all respects to that specified;

- b. represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
        - c. certifies that the cost data presented is complete and includes all related costs under this Contract except the Architect's redesign costs; and waives all claims for additional costs related to the substitution which subsequently become apparent; and
        - d. will coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.
      - 3. At paragraph 3.5 Warranty, add subparagraphs as follows:
        - a. 3.5.2 The warranty period shall be one calendar year commencing at time of Substantial Completion.
        - b. 3.5.3 The Contractor will, at his own expense, repair and replace all such defective work, and all other work damaged thereby which become defective during the term of the Guarantee-Warranty. 3.5.4 Secure additional warranties as required by the Contract Documents from Subcontractors addressed to and in favor of the Owner. Deliver copies of same to Construction Manager upon completion of work.
      - 4. At paragraph 3.6 Taxes: Add the following subparagraph:
        - a. 3.6.2 The Contractor shall accept and assume liability for timely compliance with the payment of all assessments and taxes under State and Federal social security laws, unemployment insurance, and other similar laws which otherwise might impose liability on the Owner in connection with the work.
      - 5. At paragraph 3.12 Shop Drawings, Product Data, and Samples, add subparagraph 3.12.11 as follows:
        - a. 3.12.11 Where the specifications require materials or appliances to be installed in accordance with the manufacturer's specifications, instructions, or directions and such instructions have been approved by the Architect as complying with the intent of the Specifications, they will be considered as part of the Specifications and shall be carefully followed in the execution of the Work. Labor and materials required to comply with the manufacturer's instructions shall be provided as part of the Contract Sum.
- 1.5 AMENDMENTS TO ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY
- A. Add the following sentence to end of subparagraph 10.1.1:
    - 1. The Work of this Contract includes asbestos abatement in specific areas as scheduled.
- 1.6 AMENDMENTS TO ARTICLE 11 INSURANCE AND BONDS
- A. Modify paragraph 11.1 Contractor's Liability Insurance as follows:
    - 1. Add the following clauses 11.1.1.8 and 11.1.1.9 to 11.1.1:
  - B. 11.1.1.8 Liability insurance shall include all major divisions of coverage and be on a comprehensive basis including:
    - 1. Premises-Operations.
    - 2. Independent Contractors' Protective.
    - 3. Products and Completed Operations.
    - 4. Contractual Liability, including specified provision for Contractor's obligation under Paragraph 3.18 Owned, non-owned, and hired motor vehicles.
    - 5. Broad Form Property Damage including Completed Operations.
  - C. 11.1.1.9 If the General Liability coverage's are provided by a Commercial General Liability Policy on a claims-made basis, the policy date or Retroactive Date shall predate the Contract; the termination date of the policy or applicable extended reporting period shall be no earlier than the termination date of coverage's required to be maintained after final payment, certified in accordance with Subparagraph 9.10.2

- D. Add the following clause, 11.1.2.1 to 11.1.2
1. 11.1.2.1 The insurance required by Subparagraph 11.1.1 shall be written for not less than the following limits, or greater if required by law: The Owner may require coverage's greater than the limits specified below. Additional premiums required as a result of such additional coverage will be added to the Contract Sum,
    - a. Workers Compensation and Occupational Disease                      Statutory
    - b. Public Liability and Property Damage
      1. Bodily Injury
 

\$1,000,000.00	Each Occurrence
\$2,000,000.00	Aggregate
      2. Property Damage
 

\$1,000,000.00	Each Occurrence
\$2,000,000.00	Aggregate
    - c. Business Auto Liability (including owned, non-owned and hired vehicles)
      1. Bodily Injury
 

\$1,000,000.00	Each Person
\$2,000,000.00	Each Occurrence
      2. Property Damage
 

\$1,000,000.00	Each Occurrence
----------------	-----------------
- E. Add the following sentence to subparagraph 11.1.3
1. If this insurance is written on the Comprehensive General Liability policy form, the Certificates shall be AIA Document G705. If this insurance is written on a Commercial General Liability policy form, ACORD forms 25S will be acceptable.

END OF SECTION 00811





## DIVISION 1

## GENERAL REQUIREMENTS

01100	Summary Work	01100-1 to 2
01120	Multiple Contract Summary	01120-1 to 3
01250	Substitution Procedures	01250-1 to 2
01260	Contract Modification Procedures	01260-1 to 2
01290	Payment Procedures	01290-1 to 3
01310	Project Management & Coordination	01310-1 to 5
01320	Construction Progress Documentation	01320-1 to 5
01323	Photographic Documentation	01323-1 to 2
01330	Submittal Procedures	01330-1 to 7
01400	Quality Requirements	01400-1 to 5
01420	References	01420-1 to 7
01500	Temporary Facilities and Controls	01500-1 to 5
01600	Product Requirements	01600-1 to 3
01730	Execution	01730-1 to 5
01741	Construction Waste Management and Disposal	01741-1
01770	Closeout Procedures	01770-1 to 4
01782	Operation and Maintenance Data	01782-1 to 5
01783	Project Record Documents	01783-1 to 3



## SECTION 01100

## SUMMARY

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

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

## B. Related Requirements:

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

## 1.2 PROJECT INFORMATION

## A. Project Identification: Pathways United Methodist Church, New Building.

1. Project Location: Oronogo, Missouri

## B. Owner: Pathways UMC.

1. Owner's Representative: Joplin Construction Design and Management, Inc.

## C. Project Coordinator for Multiple Contracts: Joplin Construction Design and Management, Inc has been appointed by Owner to serve as Project coordinator.

## 1.3 WORK COVERED BY CONTRACT DOCUMENTS

## A. The Work of Project is defined by the Contract Documents:

## B. Type of Contract.

1. Project will be constructed under coordinated, concurrent multiple contracts. See Division 01 Section "Multiple Contract Summary" for a description of work included under each of the multiple contracts and for the responsibilities of Project coordinator.

## 1.4 WORK UNDER SEPARATE CONTRACTS

## A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

## 1.5 ACCESS TO SITE

## A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

## B. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

## C. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
  - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
  - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

- D. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

#### 1.6 COORDINATION WITH OCCUPANTS

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

#### 1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
  - 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: The contractor work hours shall comply with local codes

#### 1.8 SPECIFICATION AND DRAWING CONVENTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

## SECTION 01120

## MULTIPLE CONTRACT SUMMARY

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for work of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Requirements:
  - 1. Division 01 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of Project site, coordination with occupants, and work restrictions.

## 1.2 DEFINITIONS

- A. Permanent Enclosure: As determined by Architect, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

## 1.3 PROJECT COORDINATOR

- A. Project coordinator shall be responsible for coordination between all Contracts.

## 1.4 COORDINATION ACTIVITIES

- A. Coordination activities of Project coordinator include, but are not limited to, the following:
  - 1. Provide overall coordination of the Work.
  - 2. Coordinate shared access to workspaces.
  - 3. Coordinate product selections for compatibility.
  - 4. Provide overall coordination of temporary facilities and controls.
  - 5. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
  - 6. Coordinate construction and operations of the Work with work performed by each Contract and separate contracts.
  - 7. Prepare coordination drawings in collaboration with each contractor to coordinate work by more than one contract.
  - 8. Coordinate sequencing and scheduling of the Work including a combined contractors' construction schedule for entire Project.
  - 9. Provide photographic documentation.
  - 10. Provide quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements."
  - 11. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
  - 12. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
  - 13. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
  - 14. Provide field surveys of in-progress construction and site work and final property survey.
  - 15. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
  - 16. Coordinate cutting and patching.
  - 17. Coordinate protection of the Work.
  - 18. Coordinate firestopping.
  - 19. Coordinate completion of interrelated punch list items.
  - 20. Coordinate preparation of Project record documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.

21. Print and submit record documents if installations by more than one contractor are indicated on the same contract drawing or shop drawing.
  22. Collect record Specification Sections from contractors, collate Sections into numeric order, and submit complete set.
  23. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
- B. Responsibilities of Project coordinator for temporary facilities and controls include, but are not limited to, the following:
1. Provide common-use field office for use by all personnel engaged in construction activities.
  2. Provide telephone service for common-use facilities.
- 1.5 GENERAL REQUIREMENTS OF CONTRACTS
- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work of each Contract, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.
1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
  2. Trenches and other excavation for the work of each contract shall be the work of each contract for its own work.
  3. Blocking, backing panels, sleeves, and metal fabrication supports for the work of each contract shall be the work of each contract for its own work.
  4. Furnishing of access panels for the work of each contract shall be the work of each contract for its own work. Installation of access panels shall be the work of each contract for its own work.
  5. Equipment pads for the work of each contract shall be the work of each contract for its own work.
  6. Roof-mounted equipment curbs for the work of each contract shall be the work of each contract for its own work.
  7. Painting for the work of each contract shall be the work of each contract for its own work.
  8. Cutting and Patching: Provided under each contract for its own work
  9. Contractors' Startup Construction Schedule: Within five working days after startup horizontal bar-chart-type construction schedule submittal has been received from Project coordinator, submit a matching startup horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the work.
1. Project coordinator shall coordinate substitutions.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 01 Section "Temporary Facilities and Controls," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
  2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
  3. Its own field office, complete with necessary furniture, utilities, and telephone service.
  4. Its own storage and fabrication sheds.
  5. Temporary enclosures for its own construction activities.
  6. Staging and scaffolding for its own construction activities.
  7. General hoisting facilities for its own construction activities, up to 2 tons (2000 kg).
  8. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
  9. Progress cleaning of work areas affected by its operations on a daily basis.
  10. Secure lockup of its own tools, materials, and equipment.
  11. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.

- D. Temporary Heating, Cooling, and Ventilation: The HVAC Contract is responsible for temporary heating, cooling, and ventilation, including utility-use charges, temporary meters, and temporary connections.
  - E. Temporary Heating, Cooling, and Ventilation: The HVAC Contract is responsible for temporary heating, cooling, and ventilation before weathertight enclosure of building is complete. The HVAC Contract is responsible for temporary heating, cooling, and ventilation after permanent enclosure of building is complete and Owner will pay utility-use charges.
  - F. Use Charges: Comply with the following:
    - 1. Sewer Service: Include the cost for sewer service use by all parties engaged in construction activities at Project site in the Plumbing Contract.
    - 2. Water Service: Include the cost for water service, whether metered or otherwise, for water used by all entities engaged in construction activities at Project site in the Plumbing Contract.
    - 3. Electric Power Service: Include the cost for electric power service, whether metered or otherwise, for electricity used by all entities engaged in construction activities at Project site in the Electrical Contract.
- 1.6 GENERAL CONSTRUCTION CONTRACT
- A. Work in the General Construction Contract includes, but is not limited to, the following:
    - 1. Remaining work not identified as work under other contracts.
  - B. Temporary facilities and controls in the General Construction Contract include, but are not limited to, the following:
    - 1. Temporary facilities and controls that are not otherwise specifically assigned to the Plumbing Contract, HVAC Contract, Electrical Contract.
- 1.7 PLUMBING CONTRACT
- A. Work in the Plumbing Contract includes, but is not limited to, the following:
    - 1. Plumbing connections to equipment furnished by the General Construction Contract, Plumbing Contract, HVAC Contract, Electrical Contract
  - B. Temporary facilities and controls in the Plumbing Contract include, but are not limited to, the following:
    - 1. Plumbing connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, HVAC Contract Electrical Contract.
- 1.8 HVAC CONTRACT
- A. Work in the HVAC Contract includes, but is not limited to, the following:
    - 1. Mechanical connections to equipment furnished by the General Construction Contract Plumbing Contract, HVAC Contract, Electrical Contract.
- 1.9 ELECTRICAL CONTRACT
- A. Work in the Electrical Contract includes, but is not limited to, the following:
    - 1. Electrical connections to equipment furnished by the General Construction Contract Plumbing Contract, HVAC Contract, Electrical Contract
  - B. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:
    - 1. Electrical connections to existing systems and temporary facilities and controls furnished by the General Construction Contract, Plumbing Contract, HVAC Contract, Electrical Contract

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01120





## SECTION 01250

## SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 DEFINITIONS

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

## 1.3 ACTION SUBMITTALS

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

Representative will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

- a. Forms of Acceptance: Change Order, Construction Change Directive, or Owners Representative's Supplemental Instructions for minor changes in the Work.
- b. Use product specified if Owners Representative does not issue a decision on use of a proposed substitution within time allocated.

#### 1.4 QUALITY ASSURANCE

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

### PART 2 - PRODUCTS

#### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  1. Conditions: Owners Representative will consider Contractor's request for substitution when the following conditions are satisfied:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution will not adversely affect Contractor's construction schedule.
    - c. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - d. Requested substitution is compatible with other portions of the Work.
    - e. Requested substitution has been coordinated with other portions of the Work.
    - f. Requested substitution provides specified warranty.
    - g. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Not allowed

### PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

## SECTION 01260

## CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 MINOR CHANGES IN THE WORK

- A. Owners Representative will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

## 1.3 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Owners Representative will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Owners Representative are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
  - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - c. Include costs of labor and supervision directly attributable to the change.
  - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - e. Quotation Form: Use forms acceptable to Owners Representative.

- B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Owners Representative

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

## 1.4 ADMINISTRATIVE CHANGE ORDERS

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

## 1.5 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Owners Representative will issue a Change Order for signatures of Owner and Contractor.

1.6 CONSTRUCTION CHANGE DIRECTIVE

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01260

## SECTION 01290

## PAYMENT PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule. Cost-loaded Critical Path Method Schedule may serve to satisfy requirements for the schedule of values.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Owners Representative at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
  - 1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Owners Representative.
    - c. Owners Representative's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  - 2. Arrange schedule of values consistent with format of AIA Document G703.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum. 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.
    - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

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 Owners Representative and paid for by Owner.
1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Times: Submit Application for Payment to Owners Representative by the 20th of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
- D. Application for Payment Forms: Use forms acceptable to Owner and Owners Representative for Applications for Payment.
- E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owners Representative 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 three signed and notarized original copies of each Application for Payment to Owners Representative by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- 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. Submittal schedule (preliminary if not final).
  6. List of Contractor's staff assignments.
  7. List of Contractor's principal consultants.
  8. Copies of building permits.
  9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  10. Initial progress report.
  11. Report of preconstruction conference.
  12. Certificates of insurance and insurance policies.
- I. Application for Payment at Substantial Completion: After Owners Representative issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

- J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706-1994, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A-1994, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707-1994, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  9. Final liquidated damages settlement statement.

PART 2 – PRODUCTS (Not used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01290





## SECTION 01310

## PROJECT MANAGEMENT AND COORDINATION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. Coordination drawings.
  - 2. Requests for Information (RFIs).
  - 3. Project meetings.
- B. Related Requirements:
  - 1. Division 01 Section "Multiple Contract Summary" for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
  - 2. 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 Owner, Owners Representative, or Contractor seeking information required by or clarifications of the Contract Documents.

## 1.3 INFORMATIONAL SUBMITTALS

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

## 1.4 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities 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. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.

### 1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Owners Representative indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.
  2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  6. Review: Owners Representative will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

### 1.6 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Owners Representative
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
- C. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Owners Representative.

- D. Owners Representative's Action: Owners Representative will review each RFI, determine action required, and respond. Allow seven working days for Owners Representative's response for each RFI. RFIs received by Owners Representative 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 Owners Representative's actions on submittals.
    - f. Incomplete RFIs or inaccurately prepared RFIs.
  2. Owners Representative's action may include a request for additional information, in which case Owners Representative's time for response will date from time of receipt of additional information.
  3. Owners Representative'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 Owners Representative in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly to Owners Representative. Include the following:
1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Owners Representative
  4. RFI number including RFIs that were dropped and not submitted.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Owners Representative's response was received.
- F. On receipt of Owners Representative's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owners Representative within seven days if Contractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.
- 1.7 PROJECT MEETINGS
- A. General: Owners Representative will 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 Owners Representative of scheduled meeting dates and times.
  2. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Owners Representative, within three days of the meeting.
- B. Preconstruction Conference: Owners Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Owners Representative.
1. Attendees: Authorized representatives of Owner, Owners Representative, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for RFIs.
    - g. Procedures for testing and inspecting.
    - h. Procedures for processing Applications for Payment.

- i. Distribution of the Contract Documents.
  - j. Submittal procedures.
  - k. Preparation of record documents.
  - l. Use of the premises and existing building
  - m. Work restrictions.
  - n. Working hours.
  - o. Owner's occupancy requirements.
  - p. Responsibility for temporary facilities and controls.
  - q. Procedures for moisture and mold control.
  - r. Procedures for disruptions and shutdowns.
  - s. Construction waste management and recycling.
  - t. Parking availability.
  - u. Office, work, and storage areas.
  - v. Equipment deliveries and priorities.
  - w. First aid.
  - x. Security.
  - y. Progress cleaning.
3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Owners Representative of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility problems.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Owners Representative will conduct progress meetings at regular intervals.
1. Attendees: In addition to representatives of Owner, and Owners Representative, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Quality and work standards.
      - 11) Status of correction of deficient items.
      - 12) Field observations.
      - 13) Status of RFIs.
      - 14) Status of proposal requests.
      - 15) Pending changes.
      - 16) Status of Change Orders.
      - 17) Pending claims and disputes.
      - 18) Documentation of information for payment requests.
  3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310



## SECTION 01320

## CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Construction schedule updating reports.
  - 3. Daily construction reports.
  - 4. Site condition reports.
- B. Related Requirements:
  - 1. Division 01 Section "Multiple Contract Summary" for preparing a combined Contractor's construction schedule.

## 1.2 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

## 1.3 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. PDF electronic file or Two paper copies.
- B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
  - 3. Total Float Report: List of all activities sorted in ascending order of total float.

4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work until most recent Application for Payment.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.
- G. Site Condition Reports: Submit 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, submittal schedule, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from entities involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### PART 2 - PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work 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 main element of the Work. Comply with the following:
  1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Owners Representative.
  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 submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Owners Representative's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
  1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  5. Work Stages: Indicate important stages of construction for each major portion of the Work.



- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  - 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
  - 1. Use Microsoft Project, Primavera, Prolog or other software approved by the Owner's Representative.

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

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

1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
  10. Dollar value of activity (coordinated with the schedule of values).
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.

### 2.3 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. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events.
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.
  14. Change Orders received and implemented.
  15. Construction Work Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Owners Representative, Owner, separate contractors, testing and inspecting agencies, and other parties identified by the Owners representative 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 01320c



## SECTION 01323

## PHOTOGRAPHIC DOCUMENTATION

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 INFORMATIONAL SUBMITTALS

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

## PART 2 - PRODUCTS

## 2.1 PHOTOGRAPHIC MEDIA

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

## PART 3 - EXECUTION

## 3.1 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
  - 1. Date and Time: Include date and time in file name for each image.
  - 2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Owners Representative.
- C. Preconstruction Photographs: Before starting construction, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Owners Representative.
  - 1. Flag excavation areas and construction limits before taking construction photographs.
  - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
  - 3. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
- D. Periodic Construction Photographs: Take 20 photographs weekly, with timing each month adjusted to coincide with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

- E. Final Completion Construction Photographs: Take 20 color photographs after date of Substantial Completion for submission as Project Record Documents. Owners Representative will inform photographer of desired vantage points.

END OF SECTION 01323

## SECTION 01330

## SUBMITTAL PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 DEFINITIONS

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

## 1.3 ACTION SUBMITTALS

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

## 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Owners Representative's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided by Owners Representative for Contractor's use in preparing submittals.
  - 1. Owners Representative will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings and Project record drawings.
    - a. Owners Representative makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    - b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Owners Representative.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Owners Representative reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Owners Representative'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 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Owners Representative 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 15days for review of each resubmittal.

- D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately **6 by 8 inches** on label or beside title block to record Contractor's review and approval markings and action taken by Owners Representative.
  3. Include the following information for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name of Owners Representative.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of subcontractor.
    - g. Name of supplier.
    - h. Name of manufacturer.
    - i. 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).
    - j. Number and title of appropriate Specification Section.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.
    - m. Other necessary identification.
  4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Owners Representative observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
    - a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Owners Representative.
  5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Owners Representative will discard submittals received from sources other than Contractor.
    - a. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
      - 1) Project name.
      - 2) Date.
      - 3) Destination (To:).
      - 4) Source (From:).
      - 5) Name and address of Owners Representative.
      - 6) Name of Construction Manager.
      - 7) Name of Contractor.
      - 8) Name of firm or entity that prepared submittal.
      - 9) Names of subcontractor, manufacturer, and supplier.
      - 10) Category and type of submittal.
      - 11) Submittal purpose and description.
      - 12) Specification Section number and title.
      - 13) Specification paragraph number or drawing designation and generic name for each of multiple items.
      - 14) Drawing number and detail references, as appropriate.
      - 15) Indication of full or partial submittal.
      - 16) Transmittal number[, numbered consecutively.
      - 17) Submittal and transmittal distribution record.
      - 18) Remarks.
      - 19) Signature of transmitter.
- E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.



- a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
- 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Owners Representative.
- 4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owners representative, containing the following information:
  - a. Project name.
  - b. Date.
  - c. Name and address of Owners Representative.
  - d. Name of Construction Manager.
  - e. Name of Contractor.
  - f. Name of firm or entity that prepared submittal.
  - g. Names of subcontractor, manufacturer, and supplier.
  - h. Category and type of submittal.
  - i. Submittal purpose and description.
  - j. Specification Section number and title.
  - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
  - l. Drawing number and detail references, as appropriate.
  - m. Location(s) where product is to be installed, as appropriate.
  - n. Related physical samples submitted directly.
  - o. Indication of full or partial submittal.
  - p. Transmittal number, numbered consecutively.
  - q. Submittal and transmittal distribution record.
  - r. Other necessary identification.
  - s. Remarks.
- 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
  - a. Project name.
  - b. Number and title of appropriate Specification Section.
  - c. Manufacturer name.
  - d. Product name.
- F. Options: Identify options requiring selection by Owners Representative.
- G. Deviations: Identify deviations from the Contract Documents on submittals.
- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Owners Representative's action stamp.
- I. 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.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Owners Representative's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements:
  - 1. Submit electronic submittals via email as PDF electronic files.
    - a. Owners Representative will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Action Submittals: Submit three paper copies of each submittal unless otherwise indicated. Owners Representative will return two copies.

3. Informational Submittals: Submit two paper copies of each submittal unless otherwise indicated. Owners Representative will not return copies.
  4. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
    - b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in the following format:
    - a. PDF electronic file.
    - b. Three paper copies of Product Data unless otherwise indicated. Owners Representative will return two copies.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based on Owners Representative's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  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 (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm)] <Insert dimensions>.
  3. Submit Shop Drawings in the following format:
    - a. PDF electronic file or Two opaque (bond) copies of each submittal. Owners Representative will return one copy(ies).
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
  - a. Generic description of Sample.
  - b. Product name and name of manufacturer.
  - c. Sample source.
  - d. Number and title of applicable Specification Section.
3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Owners Representative will return submittal with options selected.
6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Owners Representative will retain two Sample sets; remainder will be returned.
    - 1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Submit product schedule in the following format:
    - a. PDF electronic file or Three paper copies of product schedule or list unless otherwise indicated. Owners Representative will return two copies
    - b. .
- F. Coordination Drawings Submittals: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
- G. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation."
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
- K. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Owners Representatives and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.
- U. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

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

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

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

statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 OWNERS REPRESENTATIVE'S ACTION

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

END OF SECTION 01330



## SECTION 01400

## QUALITY REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 2. Requirements for Contractor to provide quality-assurance and -control services required by Owners Representative, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
  - 1. Divisions 02 through 33 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 Owners Representative.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
  - 1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

## 1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement.

Refer conflicting requirements that are different, but apparently equal, to Owners Representative 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 Owners Representative for a decision before proceeding.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
  1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Owners Representative.
  2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Owners Representative.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

#### 1.5 REPORTS AND DOCUMENTS

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

#### 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.



- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
  - D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
  - E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
  - F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
    - 1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
  - G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329 and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
    - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
    - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
  - H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
  - I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
    - 1. Contractor responsibilities include the following:
      - a. Provide test specimens representative of proposed products and construction.
      - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
      - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
      - d. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
    - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Owners Representative with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
    - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Owners Representative
    - 2. Notify Owners Representative seven days in advance of dates and times when mockups will be constructed.
    - 3. Demonstrate the proposed range of aesthetic effects and workmanship.
    - 4. Obtain Owners Representative's approval of mockups before starting work, fabrication, or construction.
      - a. Allow seven > days for initial review and each re-review of each mockup.
    - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
    - 6. Demolish and remove mockups when directed unless otherwise indicated.
  - K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 33.
- 1.7 QUALITY CONTROL
- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
    - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.

2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
  - B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
    1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
    2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
    3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
    4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
    5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
  - C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
  - D. Retesting/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 Owners Representative and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
    1. Notify Owners Representative and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
    2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
    3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
    4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
    5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
    6. Do not perform any duties of Contractor.
  - F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
    1. Access to the Work.
    2. Incidental labor and facilities necessary to facilitate tests and inspections.
    3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
    4. Facilities for storage and field curing of test samples.
    5. Delivery of samples to testing agencies.
    6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
    7. Security and protection for samples and for testing and inspecting equipment at Project site.
  - G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- 1.8 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: 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 reviews the completeness and adequacy of those procedures to perform the Work.
    2. Notifying Owners Representative 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 Owners Representative with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 TEST AND INSPECTION LOG

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

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01400



## SECTION 01420

## 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 Owners Representative's action on Contractor's submittals, applications, and requests, "approved" is limited to Owners Representative's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Owners Representative. 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.
- 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 (The)
AABC	Associated Air Balance Council
AAMA	American Owners Representativeural Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ABAA	Air Barrier Association of America
ABMA	American Bearing Manufacturers Association
ACI	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
AHAM	Association of Home Appliance Manufacturers
AHRI	Air-Conditioning, Heating, and Refrigeration Institute, The
AI	Asphalt Institute
AIA	American Institute of Owners Representatives (The)
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
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	APA - The Engineered Wood Association
APA	Owners Representativeural Precast Association
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 (American Society of Mechanical Engineers International)
ASSE	American Society of Sanitary Engineering
ASTM	ASTM International (American Society for Testing and Materials International)
ATIS	Alliance for Telecommunications Industry Solutions
AWCMA	American Window Covering Manufacturers Association (Now WCMA)
AWCI	Association of the Wall and Ceiling Industry
AWI	Owners Representativeural Woodwork Institute
AWPA	American Wood Protection Association (Formerly: 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, Inc.
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
CEA	Consumer Electronics 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

CRI	Carpet and Rug Institute (The)
CRRC	Cool Roof Rating Council
CRSI	Concrete Reinforcing Steel Institute
CRRC	Cool Roof Rating Council
CSA	Canadian Standards Association
CSA	CSA International (Formerly: IAS - International Approval Services)
CSI	Construction Specifications Institute (The)
CSSB	Cedar Shake & Shingle Bureau
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute)
DHI	Door and Hardware Institute
ECA	Electrical Components Association
EIA	Electronic Industries Alliance
EIMA	EIFS Industry Members Association
EJCDC	Engineers Joint Contract Documents Committee
EJMA	Expansion Joint Manufacturers Association, Inc.
ESD	ESD Association (Electrostatic Discharge Association)
ETL SEMCO	Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)
FIBA	Federation Internationale de Basketball (The International Basketball Federation)
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation)
FM Approvals	FM Approvals LLC
FM Global	FM Global (Formerly: FMG - 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	(Part of GSI)
GS	Green Seal
GSI	Geosynthetic Institute
HI	Hydronics Institute
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)
HPVA	Hardwood Plywood & Veneer Association
HPW	H. P. White Laboratory, Inc.
IAPSC	International Association of Professional Security Consultants
ICBO	International Conference of Building Officials
ICEA	Insulated Cable Engineers Association, Inc.
ICRI	International Concrete Repair Institute, Inc.
ICPA	International Cast Polymer Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The)
IES	Illuminating Engineering Society of North America
IEST	Institute of Environmental Sciences and Technology
IGMA	Insulating Glass Manufacturers Alliance

ILI	Indiana Limestone Institute of America, Inc.
ISA	Instrumentation, Systems, and Automation Society, The
ISO	International Organization for Standardization
ISSFA	International Solid Surface Fabricators Association
ITS	Intertek Testing Service NA (Now ETL SEMCO)
ITU	International Telecommunication Union
KCMA	Kitchen Cabinet Manufacturers Association
LGSEA	Light Gauge Steel Engineers Association
LMA	Laminating Materials Association (Now part of CPA)
LPI	Lightning Protection Institute
MBMA	Metal Building Manufacturers Association
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 Owners Representative 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
NBGQA	National Building Granite Quarries Association, Inc.
NCAA	National Collegiate Athletic Association (The)
NCMA	National Concrete Masonry Association
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)
NOMMA	National Ornamental & Miscellaneous Metals 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)
NWFA	National Wood Flooring Association
PCI	Precast/Prestressed Concrete Institute
PDI	Plumbing & Drainage Institute
PGI	PVC Geomembrane Institute
PTI	Post-Tensioning Institute
RCSC	Research Council on Structural Connections
RFCI	Resilient Floor Covering Institute
RIS	Redwood Inspection Service
SAE	SAE International
SCAQMD	South Coast Air Quality Management District
SCTE	Society of Cable Telecommunications Engineers
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)
SIA	Security Industry Association
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)
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
SWPA	Submersible Wastewater Pump Association
TCA	Tilt-Up Concrete Association
TCNA	Tile Council of North America, Inc.
TEMA	Tubular Exchanger Manufacturers Association
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.
WASTECC	Waste Equipment Technology Association
WCLIB	West Coast Lumber Inspection Bureau

WCMA	Window Covering Manufacturers Association
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA)
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California)
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.

DIN	Deutsches Institute fur Normung e.V.
IAPMO	International Association of Plumbing and Mechanical Officials
ICC	International Code Council
ICC-ES	ICC Evaluation Service, Inc.

- 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.

COE	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 Buildings Service (See GSA)
PHS	Office of Public Health and Science
RUS	Rural Utilities Service (See USDA)
SD	State Department
TRB	Transportation Research Board
USDA	Department of Agriculture
USP	U.S. Pharmacopeia
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)
	Owners Representativeur Barriers Act (ABA)

Accessibility Guidelines for Buildings and Facilities  
Available from U.S. Access Board

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01420



## SECTION 01500

## TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 USE CHARGES

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

## 1.3 INFORMATIONAL SUBMITTALS

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

## 1.4 QUALITY ASSURANCE

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

## 1.5 PROJECT CONDITIONS

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

## PART 2 - PRODUCTS

## 2.1 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Owners Representative, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

## 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  - 1. Locate facilities to limit site disturbance as specified in 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 as directed by authorities having jurisdiction.
- C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service overhead unless otherwise indicated.
- 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. Provide additional telephone lines for the following:
    - a. Provide a dedicated telephone line for each facsimile machine in each field office.
  - 2. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
    - c. Contractor's home office.
    - d. Contractor's emergency after-hours telephone number.
    - e. Owners Representative's office.

- f. Owner's office.
- g. Principal subcontractors' field and home offices.
- 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- J. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Owners Representative and Owner to access project electronic documents and maintain electronic communications.

### 3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  - 2. Maintain support facilities until Owners Representative schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated within construction limits indicated on Drawings.
  - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. 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.
  - 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."
- D. 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.
- E. Parking: Provide temporary or use designated areas of Owner's existing parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
  - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
  - 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Division 01 Section "Execution."
- J. 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.
- K. Temporary Elevator Use: See Division 14 Sections for temporary use of new elevators.
- L. Existing Elevator Use: Use of Owner's existing elevators will not be permitted.
- M. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

- N. Existing Stair Usage: Use of Owner's existing stairs will be not permitted.
- O. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

#### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
- C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent and requirements specified in Division 31 Section "Site Clearing."
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Tree and Plant Protection: Install temporary fencing located 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.
- F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- G. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
  - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations or as indicated on Drawings.
  - 2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
- H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
- L. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
  - 1. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
  - 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  - 3. Insulate partitions to control noise transmission to occupied areas.
  - 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  - 5. Protect air-handling equipment.
  - 6. Provide walk-off mats at each entrance through temporary partition.



- M. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
1. Prohibit smoking in construction areas.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
  4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
- 3.5 MOISTURE AND MOLD CONTROL
- A. Contractor's Moisture Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
  2. Keep interior spaces reasonably clean and protected from water damage.
  3. Discard or replace water-damaged and wet material.
  4. Discard, replace, or clean stored or installed material that begins to grow mold.
  5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
  2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.
- 3.6 OPERATION, TERMINATION, AND REMOVAL
- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.  
Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000



## SECTION 01600

## PRODUCT REQUIREMENTS

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 DEFINITIONS

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

## 1.3 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Owners Representative's Action: If necessary, Owners Representative will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Owners Representative will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
    - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
    - b. Use product specified if Owners Representative does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in 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, select product compatible with products previously selected, even if previously selected products were also options.

## 1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

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

## 1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  - 3. Refer to Divisions 02 through 33. 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, are undamaged and, unless otherwise indicated, are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  - 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  - 4. Where products are accompanied by the term "as selected," Owners Representative will make selection.
  - 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Owners Representative's sample", provide a product that complies with requirements and matches Owners Representative's sample. Owners Representative's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Owners Representative from manufacturer's full range" or similar phrase, select a product that complies with requirements. Owners Representative will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
- 2.2 COMPARABLE PRODUCTS
- A. Conditions for Consideration: Owners Representative will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Owners Representative may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of Owners Representatives and owners, if requested.
  5. Samples, if requested.

PART 3 - EXECUTION (Not Used)  
END OF SECTION 016000



## SECTION 01730

## EXECUTION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner-installed products.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.
  - 9. Correction of the Work.
- B. Related Requirements:
  - 1. Division 01 Section "Summary" for limits on use of Project site.
  - 2. 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.
  - 3. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

## 1.2 INFORMATIONAL SUBMITTALS

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

## 1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Owners Representative of locations and details of cutting and await directions from Owners Representative before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety
  - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
  - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owners Representative's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements of Division 01 sustainable design requirements Section.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Owners Representative for the visual and functional performance of in-place materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

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

#### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Owners Representative promptly.
- B. General: Engage a professional engineer to lay out the Work using accepted surveying practices.
  1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish limits on use of Project site.
  3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  4. Inform installers of lines and levels to which they must comply.
  5. Check the location, level and plumb, of every major element as the Work progresses.
  6. Notify Owners Representative when deviations from required lines and levels exceed allowable tolerances.
  7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.



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

### 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: Engage a professional engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by professional engineer, 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. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
  1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Owners Representative.
  2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 CUTTING AND PATCHING

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

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
  - B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
  - C. Temporary Support: Provide temporary support of work to be cut.
  - D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
  - E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
  - F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
  - G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
    1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
    2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
    3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
    4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
    5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
    6. Proceed with patching after construction operations requiring cutting are complete.
  - H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
    1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
    2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
    5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
  - I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
- 3.7 PROGRESS CLEANING
- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
    1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
    2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
    3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
  - B. Site: Maintain Project site free of waste materials and debris.
  - C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
    1. Remove liquid spills promptly.

- 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
  - D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
  - E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
  - F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
  - G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
  - H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
  - I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
  - J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.8 STARTING AND ADJUSTING
- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
  - B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
  - C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."
- 3.9 PROTECTION OF INSTALLED CONSTRUCTION
- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
  - B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300



## SECTION 01741

## CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Disposing of nonhazardous demolition and construction waste.
- B. Related Requirements:
  - 1. Division 02 Section "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.
  - 2. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements, and for disposition of hazardous waste.
  - 3. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.
  - 4. Division 04 Section "Stone Masonry" for disposal requirements for excess stone and stone waste.
  - 5. Division 31 Section "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

## 1.2 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

## 1.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

END OF SECTION 017419



## SECTION 01770

## CLOSEOUT PROCEDURES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Requirements:
  - 1. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
  - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 4. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
  - 5. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

## 1.2 ACTION SUBMITTALS

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

## 1.3 CLOSEOUT SUBMITTALS

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

## 1.4 MAINTENANCE MATERIAL SUBMITTALS

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

## 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owners Representative. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owners Representative's signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.
  7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
  6. Advise Owner of changeover in heat and other utilities.
  7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  9. Complete final cleaning requirements, including touchup painting.
  10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Owners Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owners Representative 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 Owners Representative, 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.
- 1.6 FINAL COMPLETION PROCEDURES
- A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Owners Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owners Representative. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report and warranty.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Owners Representative will either proceed with inspection or notify Contractor of unfulfilled requirements. Owners Representative will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.



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

#### 1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  1. Organize list of spaces in sequential order.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Submit list of incomplete items in one of the following format:
    - a. MS Excel electronic file. Owners Representative will return annotated copy.
    - b. PDF electronic file. Owners Representative will return annotated copy.
    - c. Three paper copies unless otherwise indicated. Owners Representative will return two copies.

#### 1.8 SUBMITTAL OF PROJECT WARRANTIES

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

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

### PART 3 - EXECUTION

#### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
    - p. Leave Project clean and ready for occupancy.
  - C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.
- 3.2 REPAIR OF THE WORK
- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
  - B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
    1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
    2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
      - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
    3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
    4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01770

## SECTION 01782

## OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
  - 1. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

## 1.2 CLOSEOUT SUBMITTALS

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

## PART 2 - PRODUCTS

## 2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.
- B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.

2. Table of contents.
3. Manual contents.
- C. Title Page: Include the following information:
  1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Owners Representative.
  8. Names and contact information for major consultants to the Owners Representative that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.
- D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
  1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
  1. Binders: Heavy-duty, three-ring, vinyl-covered, post-type binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
  3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
  4. 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 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
  1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
  1. Fire.
  2. Flood.

3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.
- 2.3 OPERATION MANUALS
- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor is delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

## 2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Product Information: Include the following, as applicable:
  - 1. Product name and model number.
  - 2. Manufacturer's name.
  - 3. Color, pattern, and texture.
  - 4. Material and chemical composition.
  - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
  - 1. Inspection procedures.
  - 2. Types of cleaning agents to be used and methods of cleaning.
  - 3. List of cleaning agents and methods of cleaning detrimental to product.
  - 4. Schedule for routine cleaning and maintenance.
  - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

## 2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

### PART 3 - EXECUTION

#### 3.1 MANUAL PREPARATION

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

END OF SECTION 01782





## SECTION 01783

## PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
- B. Related Requirements:
  - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 2. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

## 1.2 CLOSEOUT SUBMITTALS

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

## PART 2 - PRODUCTS

## 2.1 RECORD DRAWINGS

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

3. Refer instances of uncertainty to Owners Representative for resolution.
  4. Owners Representative will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  3. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Owners Representative
    - e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

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

## 2.3 RECORD PRODUCT DATA

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

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Owners Representative's reference during normal working hours.

END OF SECTION 01783



## DIVISION 2 SITEWORK

Miscellaneous	Soils Report	1 to 21
02100	Site Preparation	02100-1 to 2
02200	Earthwork	02200-1 to 3
02270	Erosion Control Systems	02270-1 to 4
02280	Soil Termite Treatment	02360-1 to 2
02411	Selective Structure Demolition	02411-1 to 4
02510	Water Distribution	02510-1 to 4
02520	Portland Cement Concrete Paving	02320-1 to 2
02530	Sanitary Sewerage	02530-1 to 3
02630	Storm Drainage	02630-1 to 6
02740	Asphaltic Concrete Paving	02740-1 to 3
02920	Seeding	02920-1



# PALMERTON & PARRISH, INC.

#940

## Civil, Geotechnical & Materials Engineers Testing Laboratories & Environmental Services

Fred E. Palmerton, PE  
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Ronald Abbiatti, Geologist  
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Specializing In:

Geotechnical Foundation  
Materials of Construction  
Hydrology-Drainage  
Core Drilling  
Environmental Audits

August 5, 2009  
Amended  
August 10, 2009

Mr. Steve Smith  
Joplin Construction Design & Management  
P.O. Box 1604  
Joplin, Missouri 64802

RE: Pathway United Methodist Church  
Joplin, Missouri  
PPI # 191508

### INTRODUCTION

This letter was prepared to summarize the results of the test-pits excavated at the above referenced project site. Work performed and recommendations regarding site development are discussed in the following sections. Determining the allowable bearing pressure of the foundation soils at the project site was not within the scope of this study. An approximate Site Location Plan has been included with this letter as Appendix I.

**This scope of work did not include an allowance for evaluating the site for shallow or deep mining activity, researching available historic mine maps or a site reconnaissance.**

### PROJECT DESCRIPTION

The proposed new Pathway United Methodist Church facility will be located near the northeast corner of County Road 240 and Highway 96 in Joplin, Missouri. It is anticipated that the new structure will be single story in height with a slab-on-grade floor system. Minimal depths of cut and/or fill are anticipated to provide finish subgrade elevations across this site.

### WORK PERFORMED

Using a tractor mounted backhoe and operator supplied by the others, five (5) tests-pits were excavated within the proposed developmental area. Test-pits 1 and 2 were located within the proposed building footprint, while the remaining test-pits were located within new pavement areas. The overburden soils were logged in the field by a technician and bulk samples were obtained. A Test-Pit Location Plan has been included with this letter in Appendix II. Test-pit logs are presented in Appendix III.

Collected bulk samples were transported back to the laboratory for further examination and laboratory testing. Laboratory testing consisted of determining Atterberg Limit values, moisture content, and Moisture Density Relationship Standard Proctors. The standard proctors were performed for later use during anticipated site grading activities and inspection. Moisture Density Relationship Curves have

been provided in Appendix IV.

### GENERAL SUBSURFACE CONDITIONS

Approximately 1 to 1.6 ft. of grass covered topsoil was encountered across this site. Underlying the topsoil within Test-pits 1, 4 and 5, moist and firm red brown gray tan lean clay was encountered, extending to test-pit completion depth. This clay exhibits low plasticity and classifies as a CL according to the Unified Soil Classification System (USCS) criteria.

Shallow soils beneath the topsoil within the remaining test-pits, generally consist of a moist and firm red brown gray tan fat clay. These fat clays exhibit high plasticity and classifies as CH according to the USCS criteria and extend to test-pit completion depth.

Bedrock was not encountered within the test pits within the depths excavated.

Shallow groundwater was not encountered within the test pits at the time of excavation and within the depths explored, but the development of shallow groundwater should be considered possible to develop during periods of wet weather.

### SITE DEVELOPMENT RECOMMENDATIONS

Although a site grading plan has not been reviewed for this project, minimal depths of cut and/or fill are anticipated to provide finish subgrade elevations. The initial phase of site development should include clearing and grubbing of all vegetative matter and organic topsoil. Vegetative matter should not be used as controlled fill, but may be stockpiled for later use in landscape or lawn areas, or hauled off-site. Topsoil stripping on the order of 1 to 2 ft. should be anticipated.

Once topsoil removal and undercut procedures are performed, it is recommended that all building, pavement areas and undercut bottoms be proof-rolled prior to placement of controlled fill, if any, to assure a stable subgrade. Proof-rolling consists essentially of rolling the ground surface with a loaded tandem axle dump truck or similar heavy rubber tired construction equipment and noting any areas which rut or deflect during rolling. **All soft subgrade areas identified during proof-rolling should be undercut and replaced with compacted fill as outlined below. However, highly plastic natural clays, which may be exposed at finish subgrade, should be scarified a minimum of 1 ft., the moisture adjusted to within 1 to 4 percent above optimum, and compacted in accordance with the appropriate section of this report. Proof-rolling, undercutting and replacement should be monitored by a qualified representative of the Geotechnical Engineer.** The depth and areal extent of additional undercutting, if any, should be minimal but will be largely dependent upon the time of year and related soil moisture conditions. **If construction is initiated during wetter spring or winter months, the requirement for undercutting soft surficial soils below normal topsoil stripping should be anticipated and reflected in contract documents.**

**After evaluation by proof-rolling and approval, the subgrade should be scarified to a depth of at least 8 in., adjusted to within 2% of optimum moisture content (1 to 4% above optimum for CH clay subgrades), and compacted to specified density.** Placement of controlled fill may then proceed. Controlled fill should consist of inorganic low plasticity lean clay preferably containing an appreciable percentage of chert fragments. Highly plastic clay with a liquid limit greater than 50 is considered suitable for use as structural fill only if the percentage of chert fragments exceeds 35%, or if placed at least 2 ft. below footings, slabs and pavements. Large sized rock greater than 4 to 6 in. inhibits fill



compaction and should be generally excluded from controlled fill embankments.

Structural fill should be placed in no greater than 8-in. loose lifts compacted to at least 95% of maximum density as determined by Standard Proctor procedures (ASTM D 698). Adequate field density and moisture content tests should be performed to ensure compliance with project specifications. Subgrade inspection and field testing under controlled conditions are considered essential if footings are to be founded in fill. A testing frequency of at least one (1) field density test for each 2500 and 5000 sq. ft., but no less than three (3) tests per lift is recommended within building and pavement areas, respectively.

### **FLOOR SLAB RECOMMENDATIONS**

Slab-on-grade or slab-on-fill type construction is considered appropriate at the project site, **provided site preparation in accordance with the Site Development Recommendations section of this report.** Placement of 5 or more in. of compacted free-draining granular base course below slabs is recommended to limit moisture rise through slabs and to improve slab support, particularly at joints. It is recommended that a 6-mil impervious moisture barrier or equivalent be provided below slabs as required by IBC Code. If slab areas are particularly sensitive to moisture due to intended use, a 10-mil impervious barrier or thicker should be used.

**In addition to the recommended site stripping, it is considered important that the exposed subgrade not be allowed to dry or desiccate prior to footing, slab, concrete or pavement placement to limit the potential for shrink/swell potential.**

### **DRAINAGE CONSIDERATIONS**

Although it is anticipated that the CL or low CH clays would exhibit expansive behavior, it is recommended that all discharge from roof downspouts should be collected and diverted well away from the building perimeter. Rapid efficient runoff away from the building should also be provided. In addition, landscaping requiring frequent watering should be prohibited adjacent to building foundations.

### **PAVEMENT RECOMMENDATIONS**

It is anticipated that any new pavements associated with this project will be constructed of either an asphaltic concrete wearing surface placed over a base or a rigid Portland Cement Concrete pavement over a granular base.

If asphaltic paving is selected, the aggregate base may be a granular compacted crushed limestone with a gradation and quality conforming to the requirements of the Missouri Department of Transportation, Standard Specification 1007 for either Type 1 or Type 5 aggregates. The maximum lift thickness for the granular base is 4 in. Granular base thicknesses in excess of 4 in. should be placed in multiple lifts with each lift being of approximate equal thickness. The granular base should be compacted to at least 100% of Standard Proctor Compaction (ASTM D-698). The base may also be a bituminous base.

Asphaltic concrete, both base and surface, should conform to the applicable requirements of MoDOT Standard Specification 401. Asphaltic concrete should be compacted to 92 to 96% of Maximum Theoretical Gravity (ASTM D-2041). 95% of 50-Blow Marshall compaction is also accepted as a minimum compaction if the void content (Va) is within the specification value range. Substitution of an appropriate Superpave Mix Design (MoDOT Section 403) is permitted. SP 190C or SP 250C can be used in

place of the bituminous base. SP 190C or SP 125C may be used for the surface. All bituminous mix designs should have been prepared or verified within six (6) months of the date of placement on this project.

If rigid concrete paving is selected a minimum 4-in. thickness granular base compacted to 100% of Standard Proctor should be placed on the prepared subgrade. The Portland Cement Concrete mix should have a minimum 28-day compressive strength of 4000 pounds per square inch (psi). Concrete should be placed at a low slump (1 to 3 inches) and have an entrained air content of 5 to 7 percent. If an increased slump is desired, use of Super Plasticizer is recommended. The use of 6x6 in. welded wire mesh is also recommended for reinforcement.


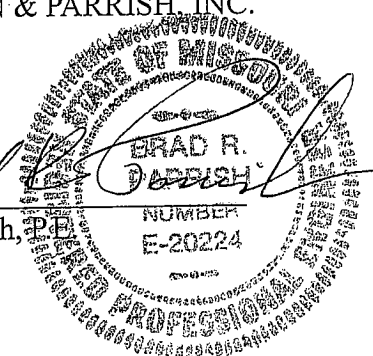
### LETTER REPORT LIMITATIONS

The depth and scope of the exploration at this site was reduced at the request of J C D & M. Our office will drill deeper borings at this site to assist in providing final foundation and site development recommendations if authorized by J C D & M. Our firm will not be liable for poor performance of earth supported structures related to deeper conditions below the depths explored.

Other than the depth of exploration, this report has been prepared in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area. Palmerton & Parrish, Inc., observed that degree of care and skill generally exercised by other consultants under similar circumstances and conditions. Palmerton & Parrish's findings and conclusions must be considered not as scientific certainties, but as opinions based on our professional judgement concerning the significance of the data gathered during the course of this investigation. Other than this, no warranty is implied or intended.


PALMERTON & PARRISH, INC.

By:

  
Brad R. Parrish, P.E.  


PALMERTON & PARRISH, INC.

By:

  
Shang M. Rader, P.E.

APPENDIX I  
SITE LOCATION PLAN



SCALE  
1" = 1000'



**PALMERTON & PARRISH, INC.**  
 4168 West Kearney Street  
 Springfield, MO 65803  
 (417) 864-6000

Site Location Plan  
 Pathways UMC - Joplin, Missouri

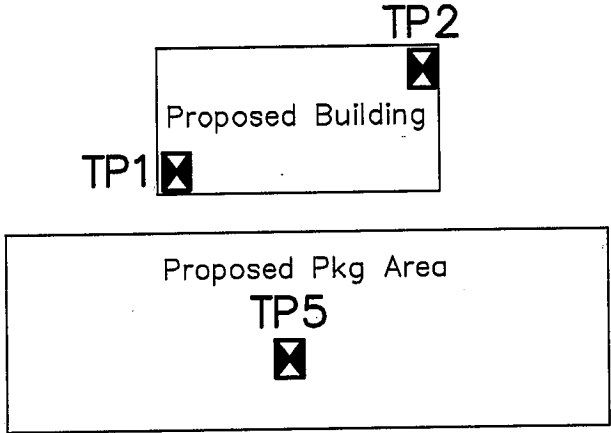
CLIENT: JCD & M  
 PROJECT NO.: 191508

DATE: 8/05/09

APPENDIX II  
TEST-PIT LOCATION PLAN

S:\Dwgs\DWG\191508 - JCD&M - Pathways - Joplin.dwg

County Road 240



Hwy 96

☒ TEST PIT LOCATION

NOT TO SCALE



**PP** PALMERTON & PARRISH, INC.  
 4168 West Kearney Street  
 Springfield, MO 65803  
 (417) 864-6000

Test Pit Location Plan  
Pathways UMC, Joplin, MO

CLIENT: JCD & M  
PROJECT NO.: 191508

DATE: 8/5/09

APPENDIX III  
TEST-PIT LOGS & LEGEND

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Civil, Geotechnical & Materials Engineers  
Testing Laboratories & Environmental Services

3500 East 13th Street  
Joplin, MO 64801  
(417) 624-2005 ph

**TEST PIT LOG**

TEST PIT NO.: 1  
SHEET: 1 OF 1

CLIENT: JOPLIN CONSTRUCTION DESIGN & MANAGEMENT DATE EXCAVATED: 07-08-09

PROJECT: PATHWAY UNITED MEDTHODIST CHURCH EQUIPMENT: BACKHOE LOGGER: RP

PROJECT LOCATION: JOPLIN, MISSOURI PROJECT NO: 191508

DEPTH (FT.)	COMPLETION DEPTH <u>3.5</u> FT.	TEST PIT LENGTH <u>5.0</u> FT.	TEST PIT WIDTH <u>2.0</u> FT.	SURFACE ELEVATION <u>N/A</u> FT.	STRATA SYMBOL	% COMPACTION	PENETROMETER (TSF)	THIN WALL SAMPLE	BULK SAMPLE	<input type="checkbox"/> Shear Strength From Indicated Test (KSF) 1      2      3      4      5										
										<input type="checkbox"/> Natural Dry Density (PCF) 20      40      60      80      100										
										<input type="checkbox"/> Water Content (%) Plastic Limit (PL)      Liquid Limit (LL)										
										<input checked="" type="checkbox"/> Standard Penetration Resistance, Blows/Ft. 10      20      30      40      50										
0	TOPSOIL (19")																			
1																				
2	MOIST & FIRM RED BROWN LEAN CLAY						2.0													
3																				
4	DISCONTINUED EXCAVATION @ 3'6"																			
5																				
6																				

WATER LEVEL OBSERVATIONS		NOTES
DURING EXC.	<u>NONE</u> FT.	
AT COMPLETION	<u>NONE</u> FT.	
AFTER _____ HRS.	_____ FT.	



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Joplin, MO 64801  
(417) 624-2005 ph

**TEST PIT LOG**

TEST PIT NO.: 2

SHEET: 1 OF 1

CLIENT: JOPLIN CONSTRUCTION DESIGN & MANAGEMENT

DATE EXCAVATED: 07-08-09

PROJECT: PATHWAY UNITED MEDTHODIST CHURCH

PROJECT LOCATION: JOPLIN, MISSOURI PROJECT NO: 191508

EQUIPMENT: BACKHOE LOGGER: RP

DEPTH (FT.)	COMPLETION DEPTH <u>3</u> FT.	TEST PIT LENGTH <u>5.0</u> FT.	TEST PIT WIDTH <u>2.0</u> FT.	SURFACE ELEVATION <u>N/A</u> FT.	STRATA SYMBOL	% COMPACTION	PENETROMETER (TSF)	THIN WALL SAMPLE	BULK SAMPLE	<input type="checkbox"/> Shear Strength From Indicated Test (KSF) 1      2      3      4      5											
										<input type="checkbox"/> Natural Dry Density (PCF) 20      40      60      80      100											
										<input type="checkbox"/> Water Content (%) Plastic Limit (PL)      Liquid Limit (LL)											
										<input checked="" type="checkbox"/> Standard Penetration Resistance, Blows/Ft. 10      20      30      40      50											
0	TOPSOIL (12")																				
1	MOIST & FIRM RED BROWN FAT CLAY																				
2							3.0														
3	DISCONTINUED EXCAVATION @ 3'0"																				
4																					
5																					
6																					

WATER LEVEL OBSERVATIONS		NOTES
DURING EXC.	<u>NONE</u> FT.	
AT COMPLETION	<u>NONE</u> FT.	
AFTER	<u>    </u> HRS. <u>    </u> FT.	

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**TEST PIT LOG**

TEST PIT NO.: 3  
SHEET: 1 OF 1

CLIENT: JOPLIN CONSTRUCTION DESIGN & MANAGEMENT DATE EXCAVATED: 07-08-09

PROJECT: PATHWAY UNITED MEDTHODIST CHURCH

PROJECT LOCATION: JOPLIN, MISSOURI PROJECT NO: 191508 EQUIPMENT: BACKHOE LOGGER: RP

DEPTH (FT.)	COMPLETION DEPTH <u>3.75</u> FT.	TEST PIT LENGTH <u>5.0</u> FT.	TEST PIT WIDTH <u>2.0</u> FT.	SURFACE ELEVATION <u>N/A</u> FT.	STRATA SYMBOL	% COMPACTION	PENETROMETER (TSF)	THIN WALL SAMPLE	BULK SAMPLE	<input type="checkbox"/> Shear Strength From Indicated Test (KSF) 1      2      3      4      5																			
										<input type="checkbox"/> Natural Dry Density (PCF) 20      40      60      80      100																			
										<input type="checkbox"/> Water Content (%)																			
										Plastic Limit (PL) _____ Liquid Limit (LL) _____																			
										<input checked="" type="checkbox"/> Standard Penetration Resistance, Blows/Ft. 10      20      30      40      50																			
0	TOPSOIL (15")																												
1	MOIST & FIRM TAN GRAY BROWN FAT CLAY							2.5																					
2																													
3	DISCONTINUED EXCAVATION @ 3'9"																												
4																													
5																													
6																													

WATER LEVEL OBSERVATIONS		NOTES
DURING EXC.	<u>NONE</u> FT.	
AT COMPLETION	<u>NONE</u> FT.	
AFTER _____ HRS.	_____ FT.	

4168 West Kearney Street  
Springfield, MO 65803  
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**PALMERTON & PARRISH, INC.**  
Civil, Geotechnical & Materials Engineers  
Testing Laboratories & Environmental Services

3500 East 13th Street  
Joplin, MO 64801  
(417) 624-2005 ph

**TEST PIT LOG**

TEST PIT NO.: 4  
SHEET: 1 OF 1

CLIENT: JOPLIN CONSTRUCTION DESIGN & MANAGEMENT DATE EXCAVATED: 07-08-09

PROJECT: PATHWAY UNITED MEDTHODIST CHURCH

PROJECT LOCATION: JOPLIN, MISSOURI PROJECT NO: 191508 EQUIPMENT: BACKHOE LOGGER: RP

DEPTH (FT.)	COMPLETION DEPTH <u>3</u> FT.	TEST PIT LENGTH <u>5.0</u> FT.	TEST PIT WIDTH <u>2.0</u> FT.	SURFACE ELEVATION <u>N/A</u> FT.	STRATA SYMBOL	% COMPACTION	PENETROMETER (TSF)	THIN WALL SAMPLE	BULK SAMPLE	<input type="checkbox"/> Shear Strength From Indicated Test (KSF) 1      2      3      4      5										
										<input type="checkbox"/> Natural Dry Density (PCF) 20      40      60      80      100										
										<input type="checkbox"/> Water Content (%) Plastic Limit (PL)   _____   Liquid Limit (LL)										
										<input checked="" type="checkbox"/> Standard Penetration Resistance, Blows/Ft. 10      20      30      40      50										
0	TOPSOIL (12")																			
1	MOIST & FIRM BROWN GRAY LEAN CLAY							2.0												
2																				
3	DISCONTINUED EXCAVATION @ 3'0"																			
4																				
5																				
6																				

WATER LEVEL OBSERVATIONS		NOTES
DURING EXC.	<u>NONE</u> FT.	
AT COMPLETION	<u>NONE</u> FT.	
AFTER	<u>      </u> HRS. <u>      </u> FT.	

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**TEST PIT LOG**

TEST PIT NO.: 5  
SHEET: 1 OF 1

CLIENT: JOPLIN CONSTRUCTION DESIGN & MANAGEMENT DATE EXCAVATED: 07-08-09  
PROJECT: PATHWAY UNITED METHODIST CHURCH  
PROJECT LOCATION: JOPLIN, MISSOURI PROJECT NO: 191508 EQUIPMENT: BACKHOE LOGGER: RP

DEPTH (FT.)	COMPLETION DEPTH <u>3.5</u> FT.	TEST PIT LENGTH <u>5.0</u> FT.	TEST PIT WIDTH <u>2.0</u> FT.	SURFACE ELEVATION <u>N/A</u> FT.	STRATA SYMBOL	% COMPACTION	PENETROMETER (TSF)	THIN WALL SAMPLE	BULK SAMPLE	<input type="checkbox"/> Shear Strength From Indicated Test (KSF) 1      2      3      4      5											
										<input type="checkbox"/> Natural Dry Density (PCF) 20      40      60      80      100											
										<input type="checkbox"/> Water Content (%) Plastic Limit (PL)      Liquid Limit (LL)											
										<input checked="" type="checkbox"/> Standard Penetration Resistance, Blows/Ft. 10      20      30      40      50											
0	TOPSOIL (17")																				
1																					
2	MOIST & FIRM TAN BROWN LEAN CLAY						3.0														
3																					
4	DISCONTINUED EXCAVATION @ 3'6"																				
5																					
6																					

WATER LEVEL OBSERVATIONS

DURING EXC. NONE FT.

AT COMPLETION NONE FT.

AFTER      HRS.      FT.

NOTES

**PALMERTON & PARRISH, INC.**  
**BORING LOG LEGEND**

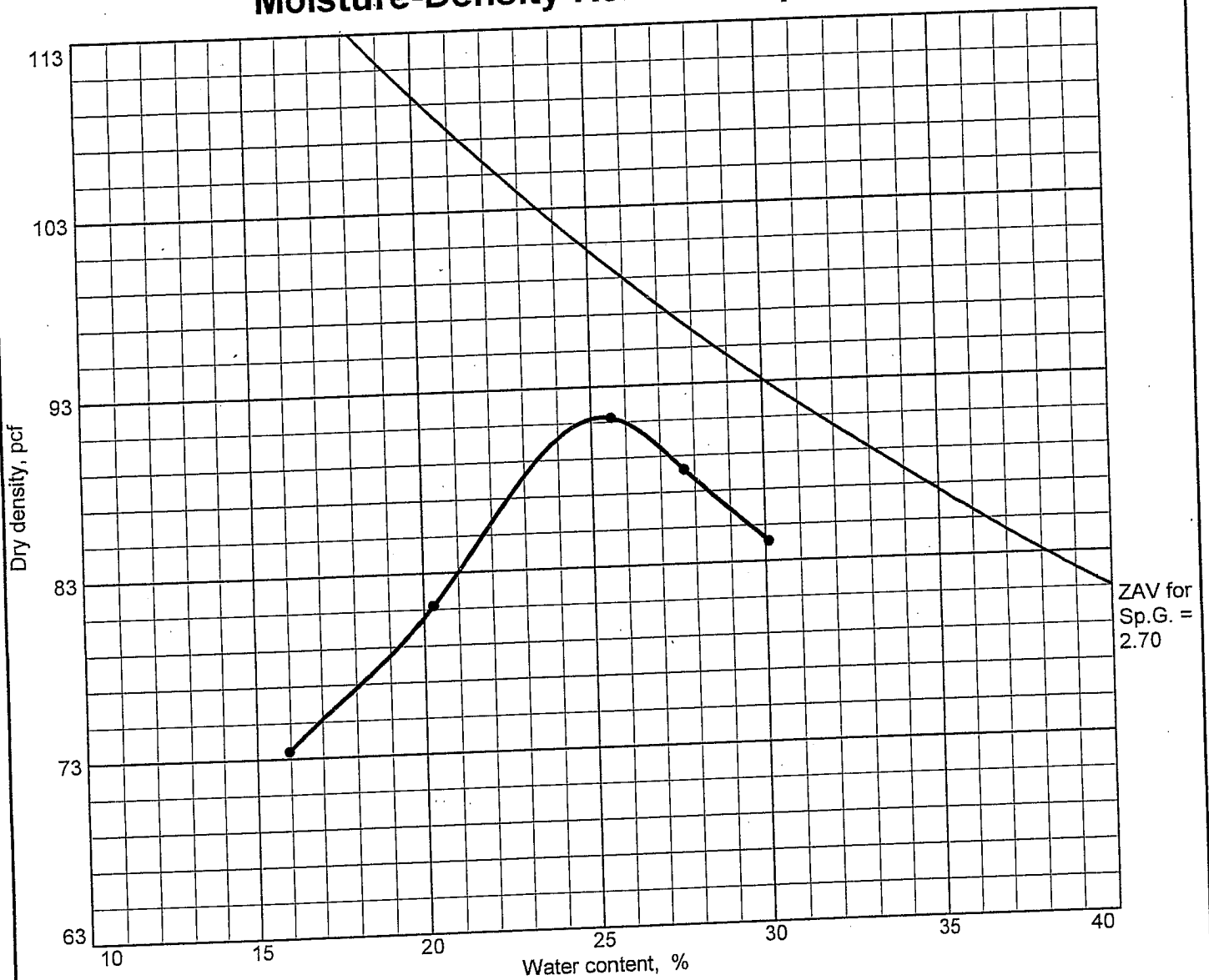
SOIL/ROCK TYPES		SOIL STRENGTH CHARACTERISTICS				
		COHESIVE SOILS			NON-COHESIVE SOILS	
		CONSISTENCY	SPT BLOWS/FT (N)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	RELATIVE DENSITY	SPT BLOWS/FT (N)
	SILT	VERY SOFT	0-2	0-0.5	VERY LOOSE	0-4
	LEAN CLAY	SOFT	3-4	0.5-1.0	LOOSE	5-10
	FAT CLAY	FIRM	5-8	1.0-2.0	MEDIUM DENSE	11-30
	SAND	STIFF	9-15	2.0-4.0	DENSE	31-50
	GRAVEL	VERY STIFF	16-30	4.0-8.0	VERY DENSE	51+
	TOPSOIL	HARD	31+	8.0+		
		DEGREE OF PLASTICITY			PI (LIQUID LIMIT - PLASTIC LIMIT)	
		NONE TO SLIGHT			0-4	
		SLIGHT			5-10	
		MEDIUM			11-30	
		HIGH TO VERY HIGH			31+	
SAMPLER TYPES		DESCRIPTION		CRITERIA		
		SHELBY TUBE (3" ø)		ABSENCE OF MOISTURE, DUSTY, DRY TO TOUCH		
		SPLIT SPOON SAMPLER (2" O.D.)		DAMP, BUT NO VISIBLE WATER		
		ROCK CORE (NQ2)		VISIBLE FREE WATER, SOIL USUALLY BELOW WATER TABLE		
		CONTINUOUS SAMPLER				
		BULK SAMPLE				
		WATER LEVEL MEASUREMENTS				
		WATER LEVELS INDICATED ON THE LOG FORMS ARE THE LEVELS MEASURED AT THE TIMES INDICATED. IN PERVIOUS SOILS, THE INDICATED LEVELS MAY REFLECT THE LOCATION OF GROUNDWATER. IN LOW PERMEABILITY SOILS, THE ACCURATE DETERMINATION OF GROUNDWATER LEVELS IS NOT POSSIBLE WITH SHORT TERM OBSERVATIONS.				
		DESCRIPTIVE TERMS				
ROD (%)      ROCK QUALITY		SLICKENSIDED		HAVING INCLINED PLANES OF WEAKNESS THAT ARE SLICK AND GLOSSY IN APPEARANCE.		
0-25      VERY POOR		FISSURED		CONTAINING SHRINKAGE CRACKS, FREQUENTLY FILLED WITH FINE SAND OR SILT.		
25-50      POOR		LAMINATED		COMPOSED OF THIN (6mm OR LESS) PARTINGS OF VARYING COLOR AND TEXTURE.		
50-75      FAIR		INTERBEDDED		COMPOSED OF ALTERNATE LAYERS OF DIFFERENT SOIL/ROCK TYPES.		
75-90      GOOD		CALCAREOUS		CONTAINING APPRECIABLE QUANTITIES OF CALCIUM CARBONATE.		
90-100      EXCELLENT		WELL GRADED		HAVING UNIFORM DISTRIBUTION FROM COARSE TO FINE PARTICLES.		
MAJOR COMPONENT OF SAMPLE      SIZE RANGE		POORLY GRADED		HAVING SIMILAR SIZE PARTICLES WITH NO SIGNIFICANT VARIANCE.		
BOULDERS      OVER 12" (>300 MM)		ARGILLACEOUS		HAVING A NOTABLE PORTION OF CLAY.		
COBBLES      12" TO 3" (300MM TO 75MM)		MOTTLED		IRREGULARLY MARKED WITH SPOTS OF DIFFERENT COLORS.		
GRAVEL      3" TO #4 SIEVE (75MM TO 4.75MM)		SYMBOL		DEFINITION		
SAND      #4 TO #200 SIEVE (4.75MM TO 0.05MM)		CFA		CONTINUOUS FLIGHT AUGER		
SILT      PASSING #200 SIEVE (0.074MM TO 0.002MM)		HSA		HOLLOW STEM AUGER		
CLAY      PASSING #200 SIEVE (<0.002MM)		DDC		DRILLING DISCONTINUED		
		RQD		ROCK QUALITY DESIGNATION		
		Δ		COHESIVE SHEAR STRENGTH (KSF)		
		□		NATURAL MOISTURE CONTENT (%)		
		○		NATURAL DRY DENSITY (PCF)		
		●		STANDARD PENETRATION N <sub>60</sub> VALUE (BLOWS/FT)		

\* SOIL CLASSIFICATION CRITERIA IN ACCORDANCE WITH ASTM D 2488.

APPENDIX IV

MOISTURE-DENSITY RELATIONSHIPS

# Moisture-Density Relationship Curve



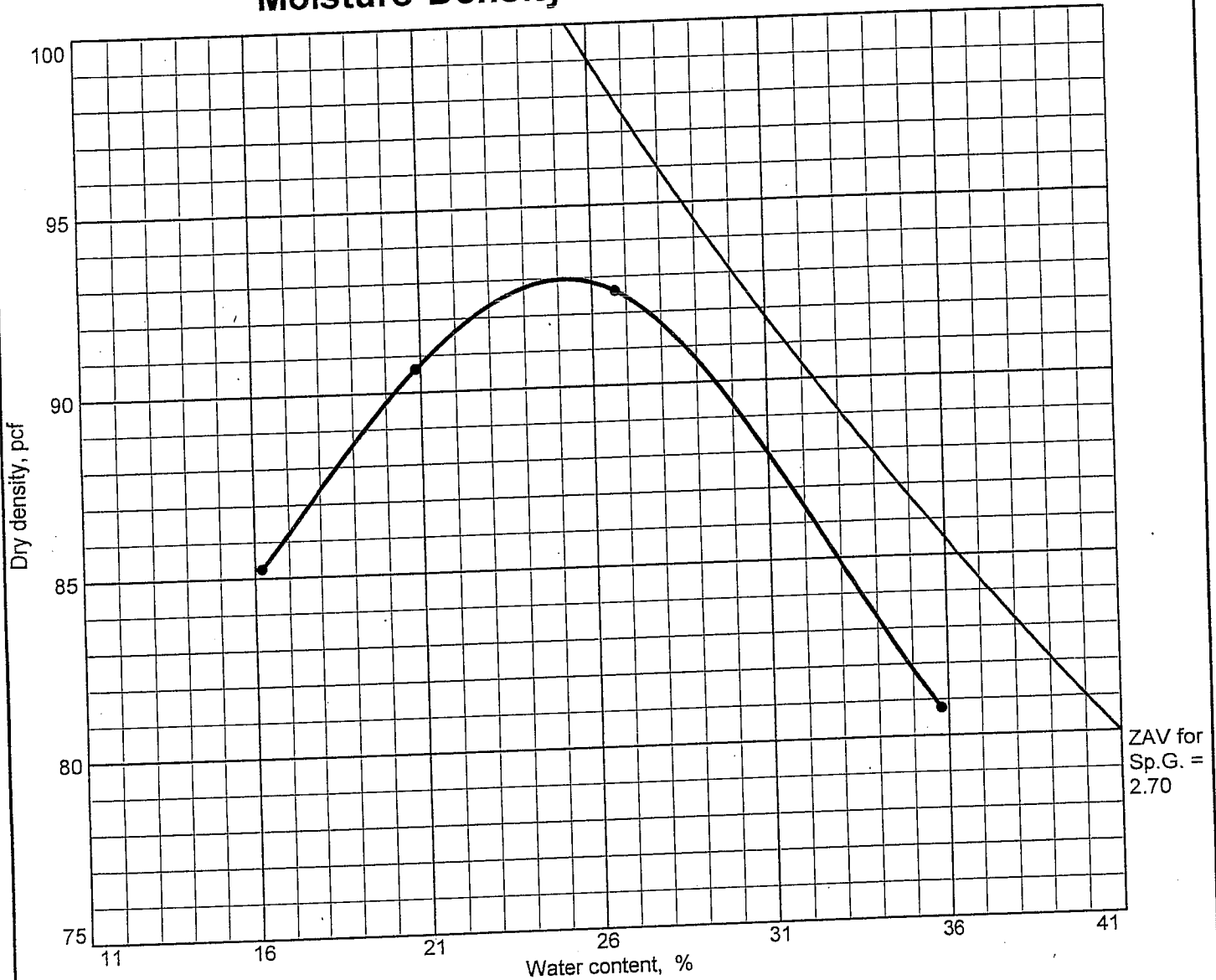
Test specification: ASTM D 698-91 Procedure C Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
1'7" to 3'6"			22.9		42	19		

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 91.3 pcf Optimum moisture = 25.3 %	Reddish Brown Lean Clay
<b>Project No.</b> 191508 <b>Client:</b> Joplin Construction Design & Management <b>Project:</b> Pathways United Methodist Church Joplin, Missouri • <b>Location:</b> On Site Test Pit #1	<b>Remarks:</b> July 24, 2009  Sample #J1938 Report #
<b>PALMERTON &amp; PARRISH, INC.</b> Springfield, MO	

Figure

# Moisture-Density Relationship Curve



Test specification: ASTM D 698-91 Procedure C Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
1' to 3'			29.1		61	37		

### TEST RESULTS

Maximum dry density = 93.0 pcf  
 Optimum moisture = 25.2 %

### MATERIAL DESCRIPTION

Reddish Brown Clay

**Project No.** 191508      **Client:** Joplin Construction Design & Management  
**Project:** Pathways United Methodist Church  
 Joplin, Missouri  
 • **Location:** On Site Test Pit #2

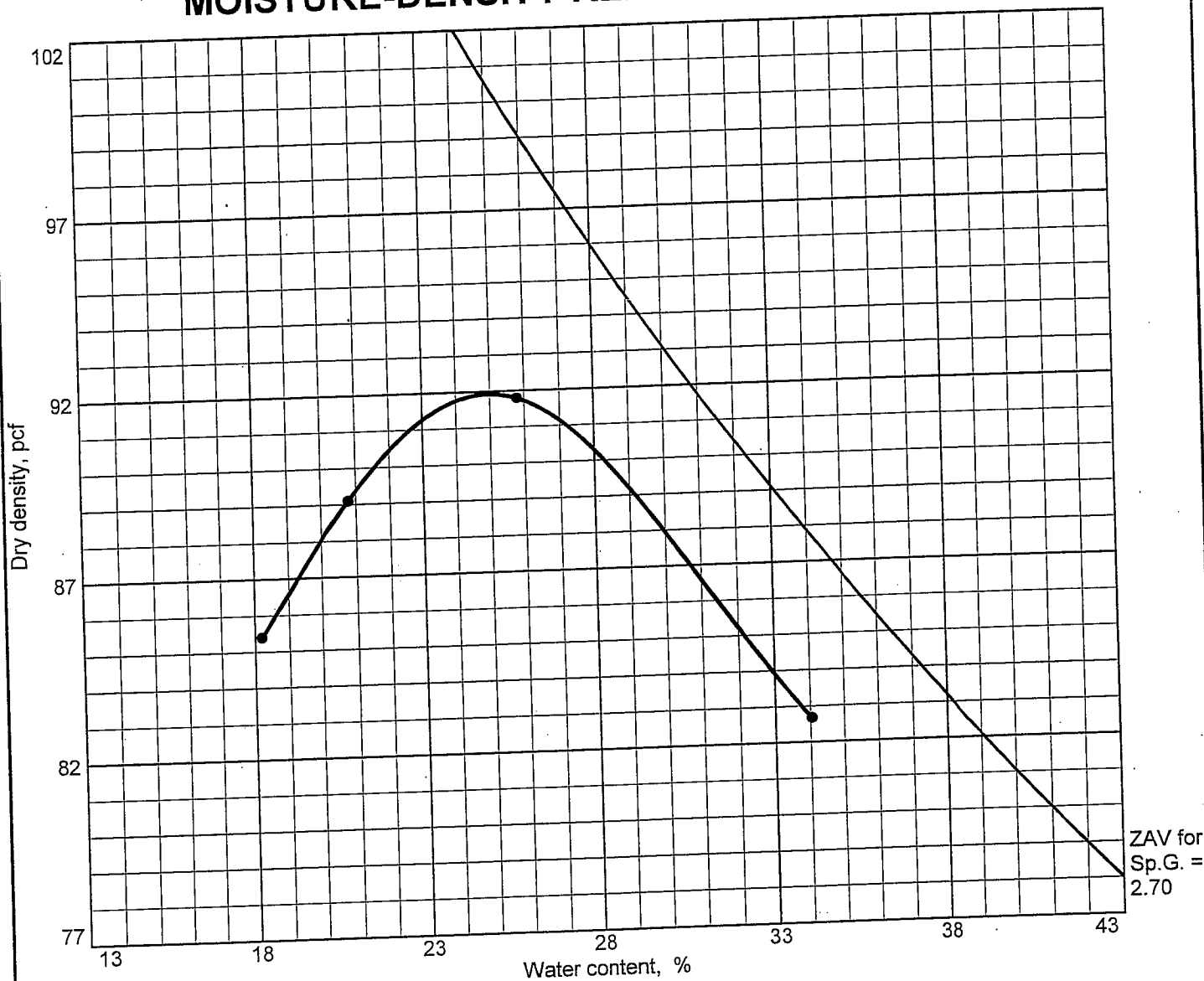
**Remarks:**  
 July 24, 2009  
 Sample #J1939  
 Report #

**PALMERTON & PARRISH, INC.**  
 Springfield, MO

Figure



# MOISTURE-DENSITY RELATIONSHIP CURVE



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1' to 3'-9"	CH		23.8		52	26		

### TEST RESULTS

Maximum dry density = 91.9 pcf  
 Optimum moisture = 25.0 %

### MATERIAL DESCRIPTION

Tannish gray mottled clay

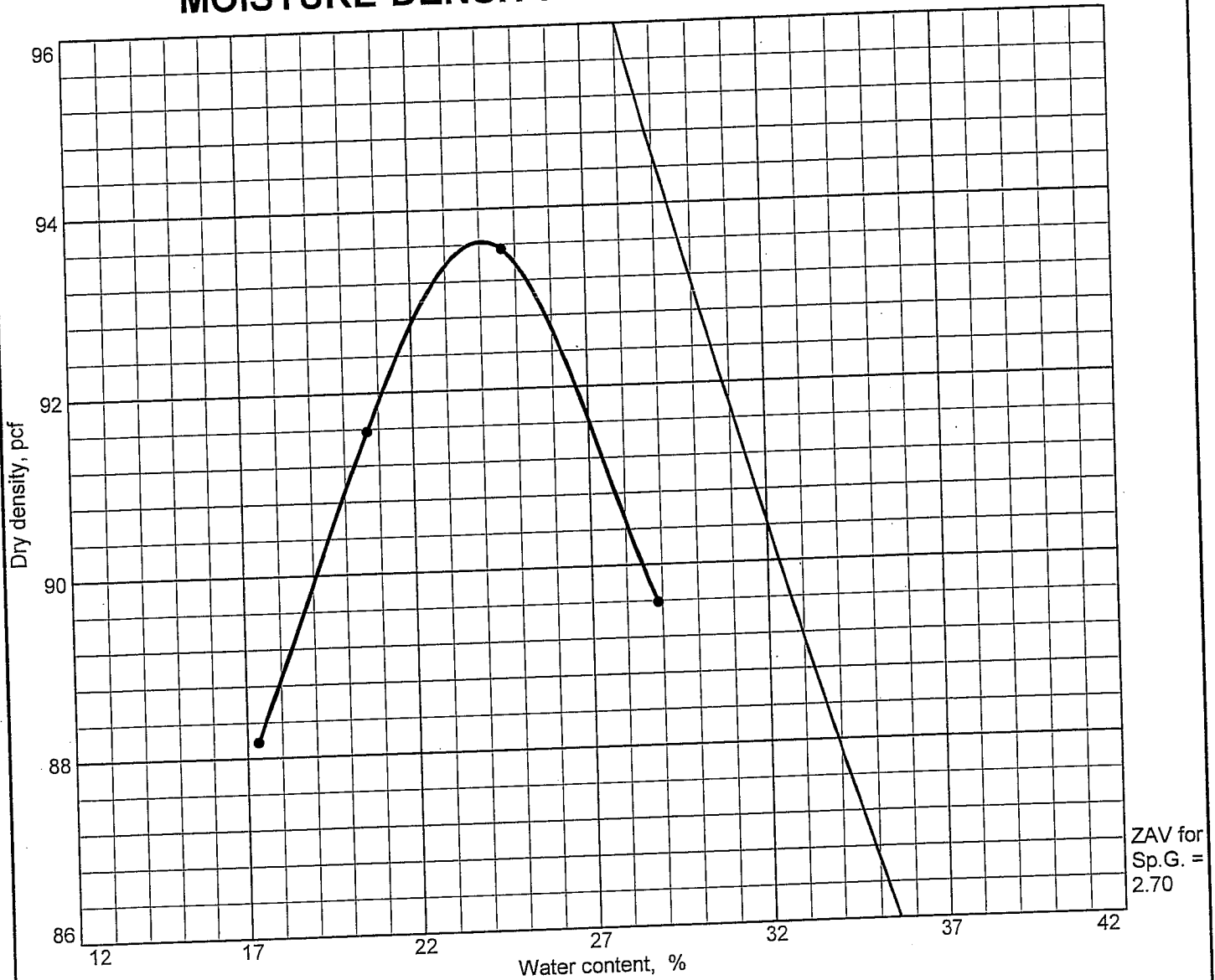
**Project No.** 191508     **Client:** Joplin Construction Design & Management  
**Project:** Pathways United Methodist Church  
 Joplin, Missouri  
 • **Location:** On-site / Test Pit #3

**Remarks:**  
 July 27, 2009  
 Sample #J1940  
 Report #

**PALMERTON & PARRISH, INC.**  
 Springfield, MO

Figure

# MOISTURE-DENSITY RELATIONSHIP CURVE



Test specification: ASTM D 698-91 Procedure A Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
1' to 3'								

### TEST RESULTS

Maximum dry density = 93.6 pcf

Optimum moisture = 24.1 %

### MATERIAL DESCRIPTION

Yellowish tan clay

**Project No.** 191508      **Client:** Joplin Construction Design & Management  
**Project:** Pathways United Methodist Church  
 Joplin, Missouri  
 ● **Location:** On-site / Test Pit #4

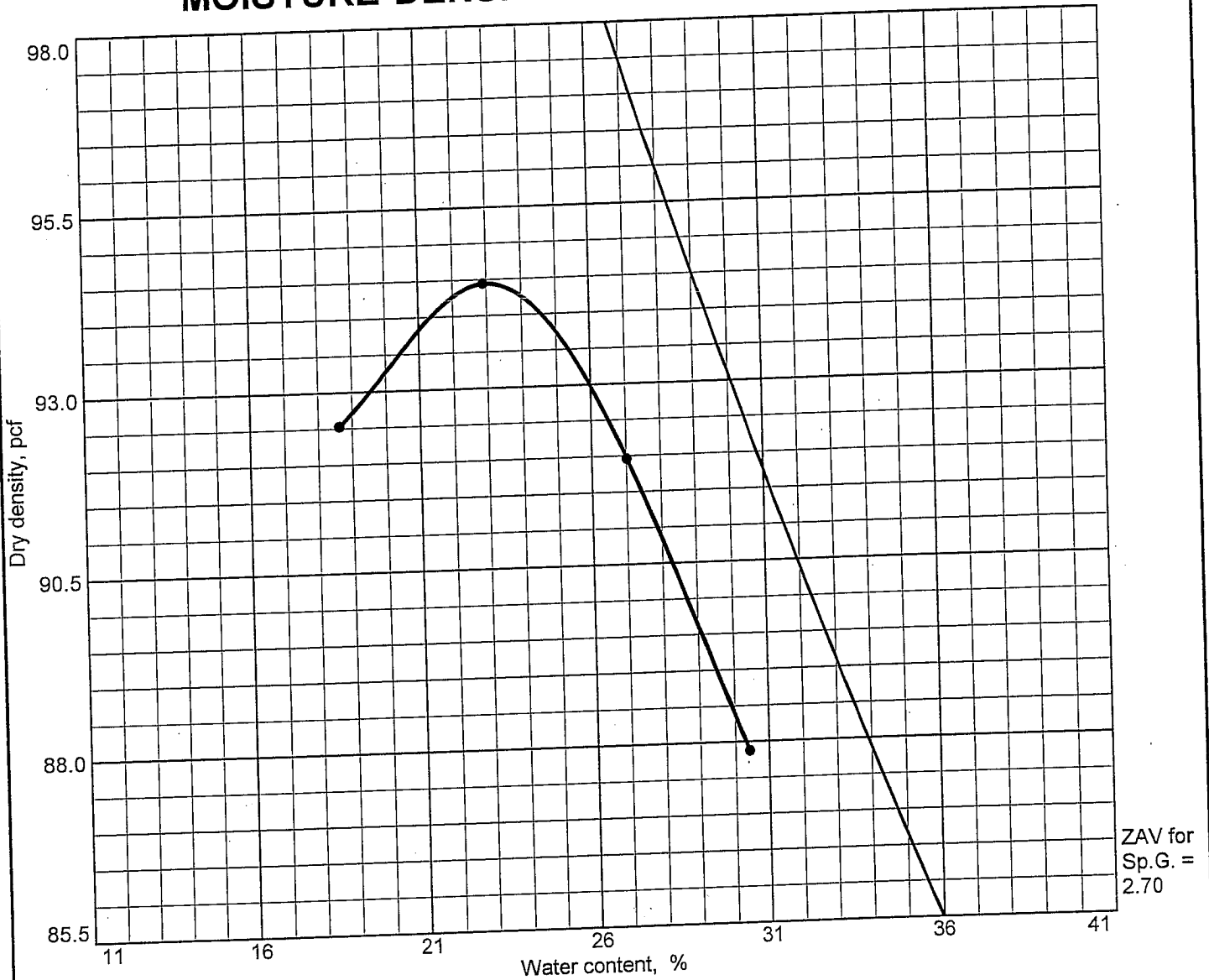
**Remarks:**

July 27, 2009  
 Sample #J1941  
 Report #

**PALMERTON & PARRISH, INC.**  
 Springfield, MO

Figure

# MOISTURE-DENSITY RELATIONSHIP CURVE



ZAV for  
Sp.G. =  
2.70

Test specification: ASTM D 698-91 Procedure C Standard

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in.	% < No.200
	USCS	AASHTO						
1.5' to 3.5'								

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 94.4 pcf Optimum moisture = 23.0 %	Reddish tan lean clay
<b>Project No.</b> 191508 <b>Client:</b> Joplin Construction Design & Management <b>Project:</b> Pathways United Methodist Church Joplin, Missouri ● <b>Location:</b> On-site / Test Pit #5	<b>Remarks:</b> July 27, 2009  Sample #J1943 Report #
<b>PALMERTON &amp; PARRISH, INC.</b> Springfield, MO	Figure



## SECTION 02100

## SITE PREPARATION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Site preparation, complete, including clearing and grubbing, removal of trees and other vegetation, topsoil stripping and stockpiling and removal of known above and below-grade appurtenances as required for new construction.

## 1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS:

- A. Protection of existing trees; Section 01500.
- B. Earthwork; Section 02200.

## 1.3 PROJECT CONDITIONS

- A. Traffic: Conduct site preparation operations to ensure minimum interference with roads, streets and other adjacent occupied and used facilities. Do not close or obstruct roads and or streets without permission from authorities having jurisdiction.
- B. Protection of existing improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place. Protect improvements on adjoining properties and on the Owner's property. restore damaged improvements to their original condition, as acceptable to parties having jurisdiction.

## PART 2 PRODUCTS (Not Applicable)

## PART 3 EXECUTION

## 3.1 SITE CLEARING

- A. General:
  1. Remove trees, shrubs, grass and other vegetation, improvements or obstructions interfering with new construction. Remove such items elsewhere on the site or premises as specifically indicated. removal includes digging out stumps and roots.
  2. Carefully and cleanly cut roots and branches of trees indicated to be left standing where such roots and branches obstruct new construction. Use sharp pruning instruments for cutting; do not break or chop. Coordinate with requirements specified in Section 01500 for tree and vegetation protection.
  3. Identify and protect all utilities from damage.
  4. Verify that survey benchmark and intended elevations for the work are as indicated.
- B. Topsoil:
  1. Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2" in diameter, and without weeds, roots and other objectionable material.
  2. Strip topsoil to whichever depths encountered in a manner to prevent intermingling with the underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping. Where trees are indicated to be left standing, cease topsoil stripping at sufficient distance to prevent damage to the main root system.
  3. Stockpile topsoil in storage piles in areas shown or where otherwise directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.
- C. Clearing and Grubbing:
  1. Clear the site of trees, shrubs and other vegetation except for that indicated to be left standing. Completely remove stumps, roots and other debris protruding through the ground surface. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.
  2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated. Place fill material in horizontal layers not to exceed 6"

loose depth and thoroughly compact to a density equal to adjacent original ground.

- D. Removal of improvements: Remove above-grade and below-grade improvements necessary to permit construction and other work as indicated. Abandonment or removal of certain underground pipe or conduits may be shown on mechanical or electrical drawings and is included under work of those sections. Removal of abandoned underground piping and conduit interfering with construction is included under this section.

3.2 DISPOSAL OF WASTE MATERIALS

- A. Burning is not permitted on the Owner's property.
- B. Remove waste materials, unsuitable topsoil and excess topsoil from the Owner's property and dispose of off site in a legal manner.

END OF SECTION

## SECTION 02200

## EARTHWORK

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Site grading, removal of topsoil and subsoil, building excavating and trenching, backfilling, and compacting.

## 1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Site Preparations; Section 02100.
- B. Asphaltic Concrete Paving; Section 02740.
- C. Portland Cement Concrete Paving; Section 02520.

## 1.3 SAMPLES

- A. If imported fill is used for earthwork, submit samples in accordance with Section 01320.
- B. Submit 10 lb (4.5 kg) sample of each type of fill to testing laboratory, in air tight containers.

## PART 2 PRODUCTS

## 2.1 SOIL MATERIALS

- A. Topsoil: Reusable excavated friable loam; free of subsoil, roots, grass, excessive amount of weeds, large stone, and foreign matter.
- B. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches and debris.

## 2.2 FILL MATERIALS

- A. Type A - (base rock): Crushed stone, or crushed or uncrushed gravel, with 0% retained in 1-1/2 sieve, 10-50% retained in 3/4 sieve, 50-75% passing #4 sieve, 70-90 retained in #40 sieve, and 90-97 retained in #200 sieve.
- B. Type B - (sub-base): Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand, as acceptable to the Architect.
- C. Type C - (drainage fill): Washed, uniformly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1-1/2 sieve and not more than 5% passing a No. 4 sieve.

## PART 3 EXECUTION

## 3.1 EXAMINATION AND PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Notify Architect/Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- C. Identify and flag known utility locations. Notify utility company to remove and relocate utilities.
- D. Maintain and protect existing utilities to remain.
- E. Verify foundation or basement walls are braced to support surcharge forces imposed by backfilling operations.

## 3.2 PROTECTION OF ADJACENT WORK

- A. Protect utilities, pavements and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
- B. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent structures.

## 3.3 TOPSOIL EXCAVATING

- A. Do not excavate wet topsoil.
- B. Excavate topsoil and stockpile in area designated on site.

## 3.4 SUBSOIL EXCAVATING

- A. Do not remove wet subsoil.
- B. Excavate subsoil required for building foundations, construction operations, and other Work.
- C. Slope banks to angle of repose or less, until shored.
- D. Excavation shall not interfere with 45 degree bearing splay of any foundation.
- E. Correct unauthorized excavation at no extra cost to Owner.
- F. Fill over-excavated areas under structure bearing surfaces in accordance with direction by Architect and/or Engineer.
- G. Stockpile subsoil in area designated on site, remove subsoil not being reused from site.

## 3.5 TRENCHING

- A. Excavate for storm sewer, sanitary sewer, water, gas and electrical piping and conduits.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Hand trim excavation and leave free of loose matter.
- D. Support pipe and conduit during placement and compaction of bedding fill.
- E. Backfill trenches to required contours and elevations.
- F. Place and compact fill materials as for Backfilling.

## 3.6 BACKFILLING

- A. Backfill areas to contours and elevations. Use unfrozen and unsaturated materials.
- B. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy sub-grade surfaces.
- C. Place and compact fill materials in continuous layers not exceeding 8 inches loose depth.
- D. Place and compact soil material in continuous layers not exceeding 8 inches loose depth.
- E. Employ a placement method so not to disturb or damage foundations, foundation perimeter drainage or utilities in trenches.
- F. Maintain optimum moisture content of backfill materials to attain required compaction density.
- G. Backfill against supported foundation walls. Backfill simultaneously on each side of unsupported foundation walls.
- H. Slope grade away from building minimum 2 inches in 10 ft, unless noted otherwise.
- I. Utility Trench Backfill:
  - 1. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints and barrels of pipes and for joints, fitting and bodies of conduits.
  - 2. Backfill trenches excavated under footing and within 18 inches of bottom of footings: fill with concrete before backfilling or placing roadway subbase.
  - 3. Place and compact initial backfill of subbase material, free of particles larger than 1 inch, to a height of 12 inches over the utility pipe or conduit.
    - a) Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.
  - 4. Coordinate backfilling with utilities testing.
  - 5. Fill voids with approved backfill material while shoring and bracing is removed.
  - 6. Place and compact final backfill of satisfactory soil material to final subgrade.
  - 7. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavement or slabs.

## 3.7 PLACING TOPSOIL

- A. Place topsoil in areas where seeding is scheduled.
- B. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of sub-grade.
- C. Remove large stone, roots, grass, weeds, debris, and foreign material while spreading.
- D. Lightly compact roll placed topsoil.
- E. Leave stockpile area and site clean and raked, ready to receive landscaping.



## 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Design/Builder will engage a qualified independent geotechnical engineering testing agency to perform field Quality-control testing.
- B. Allow testing agency to inspect and test subgrades, and each fill or back fill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
  - 1. Paved and building slab areas: at subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. or less of paved area and building slab, but in no case fewer than three tests.
  - 2. Foundation Wall Backfill: At each compacted backfill layer, at least one test for each 100 feet or less of wall length, but no fewer than two tests.
- E. When testing agency reports that subgrades, fills or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

## 3.9 TOLERANCES

- A. Top Surface of Exposed Sub grade: Plus or minus one inch.
- B. Top of Topsoil: Plus or minus 1/2 inch.

## 3.10 SCHEDULE

- A. Interior Slab-On-Grade: Type B fill compacted to 95 percent; with cover of Type A fill, 6 inches thick, compacted to 95 percent.
- B. Under walkways, scarify and re-compact top 6" below subgrade and compact each layer of backfill or fill material at 92 percent.
- C. Exterior Side of Foundation Walls and Retaining Walls Over Granular Filter Material and Foundation Perimeter Drainage: Type B fill, to sub-grade elevation, each lift compacted to 90 percent.
- D. Fill Under Landscaped Areas: Type B fill, to 12 inches below finish grade, compacted to 90 percent.
- E. Fill Subbase Under Asphalt Paving: Type A fill, to 2-1/2 inches below finish paving elevation, compacted to 95 percent.

END OF SECTION 02200



## SECTION 02270

## EROSION CONTROL SYSTEMS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Division 2, Section "Earthwork"

## 1.2 RELATED DOCUMENTS

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

## 1.3 SUMMARY

- A. This Section includes the following:
  - 1. Practices to control pollution.
  - 2. Erosion control.
- B. The Contractor shall make sure that a Missouri Department of Natural Resources Land Disturbance permit is in place before commencement of grading where one acre or more of land is being disturbed.
- C. In the event that there are other city, state or federal pollution or erosion control laws that require more stringent measures than those described in these documents, the most restrictive requirements will apply.

## 1.4 DEFINITIONS

- A. Best Management Practices (BMP's) means schedules of activities, prohibition of practices, maintenance procedures and other management practices to prevent or reduce pollution. BMP's also include treatment requirements, operating procedures and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

## 1.5 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and the requirements of this Section.
  - 1. Product data for silt fence fabric
  - 2. Reports, records and certifications required by this Section, regulatory agencies having jurisdiction, and permit requirements.

## 1.6 QUALITY ASSURANCE

- A. Codes and Standards: Install and maintain erosion control systems in compliance with all authorities having jurisdiction.

## PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Straw Bale Fence: At locations of excessive concentrated runoff, ditches, etc, and as indicated on the drawings.
- B. Anti-erosion Mulch: Clean, dry straw of winter wheat, rye, oats or barley, wood chips, bark and netting.
- C. Silt Fence: Synthetic filter fabric or a pervious sheet of polypropylene, nylon, polyester, or polyethylene yard, containing ultraviolet ray inhibitors and stabilizers providing a minimum of six months usable construction life at a temperature range from 0 to 120 degrees F. and meeting the following requirements.
  - 1. Sediment retention efficiency: Not less than 85 percent
  - 2. Grab strength at 20 percent maximum elongation:
    - a) Standard strength fabric: 30 pounds per lineal inch
    - b) Extra strength Fabric: 50 pounds per lineal inch.
  - 3. Flow rate: Not less than 0.30 gallons per square foot per minute.
- D. Silt fence posts: Contractor has the following options:
  - 1. 2 inch by 2 inch wood, 5 feet long
  - 2. 1.33 pound per lineal foot steel posts a minimum of 5 feet in length
    - a) Steel posts shall have projections for fastening the fabric.

3. Silt Fence/post system: Posts incorporated into a fence to act as an integral system. System will be capable of supporting loads imposed by collected silt and ponded water.
- E. Erosion Control Sock (if required): Provide sock(s) equal to Filtrex "Siltsoxx" per Architects direction.
- F. Provide erosion control blankets on all disturbed slopes of 4:1 or greater.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper and timely completion.
  1. Do not proceed until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Protection:
  1. Protect trees shrubs, lawns and other vegetation, and other features indicated on drawings to remain, or not indicated to be removed.
    - a. Provide temporary guards to protect trees, vegetation, structures, monuments, benchmarks, sidewalks, parking lots, utilities and anything else which could be accidentally damage is such protection is not erected around all such items which are noted on the Drawings to remain or not noted to be removed.
      - 1) Inspect all trees, vegetation, structures, monuments, benchmarks, sidewalks, parking lots, utilities and anything else within or bordering the construction boundary that is shown on the drawings to remain or not shown to remove prior to any work commencing. Take digital pictures sufficiently detailed of any existing damage or anything that might be misconstrued as having been damaged by subsequent procedures as a record of existing conditions.
        - a) Submit in written form to the Architect and/or Design/Builder along with a copy of all evidence to support all claims of prior damage or apparent damage.
        - b) Request verification from the Architect and/or Design/builder that this information was received and acknowledged.
        - c) Failure to complete the above procedure could and will result in the Contractor being held liable and required to replace and/or repair the damage or apparent damage.
      - b. Protect roots over 1-1/2 inch diameter which are cut during construction operation.
        - 1) Coat cut faces with emulsified asphalt or other acceptable coating formulated for use on damaged plant tissues.
        - 2) Temporarily cover exposed roots with wet burlap to prevent roots from drying out. Cover with earth as soon as possible.
    2. Protect benchmarks, monuments, existing structures, existing fences, existing roads, existing sidewalks, existing paving, existing curbs and other features indicated on the Drawings to remain, or not indicated to be removed, from damage and displacement. If damaged or displaced, notify the Architect and correct defects as directed and approved by the Architect.
    3. Protect above and below grade utilities which are to remain.
  - B. Preparation:
    1. Use all means necessary to control dust on and near the work, and on and near off-site storage, and spoil areas, if such dust is caused by performance of the work of this section, or if resulting from the condition in which Project Site is left by Contractor.
    2. Moisten surfaces as required to prevent dust from being a nuisance to the public, neighbors and concurrent performance of other work on the Project Site.
  - C. All temporary erosion and sediment controls must be installed before any grading can occur.

#### 3.3 GENERAL

- A. Install and/or maintain erosion control at the site's boundary at locations where stormwater runoff will leave the site prior to starting any clearing, stripping or earthwork operations.
- B. Minimize the time areas are to be exposed without vegetative cover.

- C. Clearing and grubbing within 50 feet of a defined drainageway is strictly prohibited unless such activity is clearly indicated and then shall not commence until the specific erosion control systems for that specific area are in place.
- D. Properly dispose of solid waste, paints, solvents, cleaning compounds, etc.
- E. Store construction materials in designated areas away from drainageways and low areas.
- F. Provide portable toilets and properly dispose of sanitary sewage.
- G. Construct containment berms and utilize drip pans at fuel and liquid storage tanks and containers.
- H. Provide means to direct non-stormwater runoff from the site watering, flushing of fire hydrants, water mains and similar activities to sediment basins.
- I. Contractor shall provide sediment protection for any street drop inlets, catch basins, etc. when site storm water drains to them during construction.

#### 3.4 SITE STRIPPING AND CLEARING OPERATIONS

- A. Minimize areas to be stripped to those areas of construction activity.
- B. Exposed surfaces shall be roughened to inhibit runoff and promote infiltration.
- C. At completion of topsoil stockpiling operations, stockpiles shall be shaped and graded to drain.

#### 3.5 INSTALLATION AND MAINTENANCE OF EROSION CONTROL DEVICES

- A. Install and/or maintain erosion control devices to protect adjacent and downstream properties from damage and pollution resulting from erosion caused by the work of this Contract.
  - 1. Implement and maintain erosion control measures indicated on the drawings and additional erosion control measures necessary to prevent damage to adjacent and downstream slopes.
- B. Install and/or maintain existing silt fences or straw bale fences located along perimeter of site or grading limits at locations shown, generally along contour of downstream slopes
  - 1. Install silt fence fabric from a continuous roll for the length of the silt fence whenever possible to minimize the number of joints. Fasten fabric securely to posts.
    - a. Create joints in fabric by securely fastening fabric at the support post with overlap extending to the next post.
  - 2. Drive support posts into ground not less than 18 inches. Angle posts slightly upstream, spaced at 10 feet if wire fencing is used to support fabric, otherwise space at 6 feet.
  - 3. Excavate a 4 inch deep trench on up-slope side of silt fence. Embed fabric and backfill.
    - a. Line trench with silt fence fabric material
    - b. Backfill trench with soil or gravel.
- C. Install and/or maintain straw bale fences prior to beginning any grading operations in affected areas and/or as indicated on drawings. Generally along the contour of downstream slopes
  - 1. Place straw bales in a single row, lengthwise on the contour, and embedded 4 inches into soil.
  - 2. Secure each individual bale in place by stakes or reinforcement bars driven through bales into the ground to a depth of not less than 18 inches. Angle first stake towards previously anchored bale to force bales together.
  - 3. Chink spaces between bales with loose straw.
- D. Install and/or maintain silt fence as ditch checks at locations shown on the drawings.

#### 3.6 MAINTENANCE

- A. Check silt fences, straw bale fences and sediment basin after each rainfall event to ensure that they are in proper working order.
  - 1. Check embankments and spillways for erosion, settlement or other damage.
  - 2. Immediately make all necessary repairs.
- B. Inspect silt and straw bales fences at least once a week.
  - 1. Immediately replace damaged portions of the silt fences, including portions which have collapsed, contain tears, have decomposed, or have become ineffective.
- C. Remove sediment deposits as necessary to provide adequate sediment storage and to maintain the integrity of fences. Dispose of accumulated sediment by spreading over upland areas of the site.
- D. Remove dirt, mud and debris from street caused by construction of this project.
- E. Maintain erosion control devices in place as specified until completion of the work of the Contract.
  - 1. At completion of work, remove erosion control devices when not longer needed.

2. Ditch checks.

### 3.7 INSPECTIONS

- A. Inspect all erosion control systems and devices at least once every seven calendar days.
- B. Inspect all erosion control systems and devices within 24 hours at the end of any storm which results in precipitation of  $\frac{1}{2}$  inch or more.
- C. During inspections, locations where stormwater leaves the site shall be inspected for evidence of erosion or sediment of deposition.
- D. Correct deficiencies within three calendar days.
- E. Complete a report of each inspection. Report shall contain the following minimum information.
  1. Inspectors name.
  2. Inspection date.
  3. Observations of the effectiveness of erosion control systems
  4. Actions taken or necessary to correct deficiencies.
  5. Listing of areas where construction operations have permanently or temporarily stopped.
  6. Authorized signature.

### 3.8 CHEMICAL AND SEWAGE SPILLS

- A Report hazardous substance or oil spills in accordance with requirements of 40 CFR 117 and 40 CRF 302.
- B. Report discharge or escape of sewage, substances, or waste which may contaminate or pollute water or soil to the Missouri Department of Health.

### 3.9 REMOVED SUBSTANCES

- A. Solids, sludge, sediments, or other pollutants removed in the control of runoff shall be managed in accordance with applicable statutes and regulations.

END OF SECTION 02270

## SECTION 02280

## SOIL TREATMENT

## PART 1 GENERAL

- 1.1 SCOPE:
- A. Provide soil treatment for termite control, complete.
- 1.2 SUBMITTALS: Comply with Section 01300.
- A. Product Data:
    - 1. Indicate each toxicant to be used, composition by percentage, dilution schedule, rate and volume calculations, intended application rate.
  - B. Manufacturer's Instructions: Submit current EPA approved labels for each product used.
  - C. Material Safety Data Sheets: Submit current EPA approved labels and MSDS for each product used.
- 1.3 QUALITY ASSURANCE
- A. Applicator: Professional specializing in performing the work of this section licensed by the state where the project is located and with experience in termiticide application.
  - B. Comply with requirements of State Plant Board, or other governing authority.
- 1.4 WARRANTY
- A. Provide 5 year warranty certifying that applied soil termiticide treatment will prevent infestation of subterranean termites and, that if subterranean termite activity is discovered during the warranty period, Contractor will re-treat the soil and repair or replace damage caused by termite infestation.
- 1.5 REGULATORY REQUIREMENTS
- A. Provide EPA registration numbers under Federal Insecticide, Fungicide and Rodenticide Act.
  - B. Conform to applicable codes, EPA and state and local regulations.
- 1.6 DELIVERY, STORAGE AND HANDLING
- A. Deliver products to the jobsite in original, labeled and sealed containers.
  - B. Do not store products on the jobsite.
- 1.7 PROJECT CONDITIONS:
- A. Do not apply soil treatment solution until excavating, filling and grading operations are completed. Do not apply soil treatment to frozen or excessively wet soils or during inclement weather.
  - B. Comply with handling and application instructions of the soil toxicant manufacturer.

## PART 2 PRODUCTS

- 2.1 MANUFACTURER
- A. FMC Corporation, Pest Control Specialties Operations, PO Box 8, Princeton, New Jersey 08543
- 2.2 MATERIALS
- A. Soil Treatment Solutions:
    - 1. Emulsible concentrate insecticide for dilution with water, synthetically died to permit visual identification of treated soil of a generic chemical composition approved for use by authorities having jurisdiction. At Contractor's option, one of the following or approved equal:
      - a) Dagnet FT: Termiticide containing permethrin at the rate of 3.2 lbs per gallon. EPA assigned "Signal Word" CAUTION.
      - b) Prevail FT: Termiticide containing cypermethrin at the rate of 2.0 lbs per gallon. EPA assigned "Signal Word" CAUTION.
      - c) Biflex TC: Termiticide containing bifenthrin at the rate of 2.0 lbs per gallon. EPA assigned "Signal Word" WARNING.
  - B. Water:
    - 1. Clean and not detrimental to soil or insecticide.

## PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that soils to be treated are not frozen, are sufficiently dry to absorb toxicant and ready to receive treatment.
- B. Verify that the area is well ventilated.
- C. Verify that anticipated weather conditions will comply with label recommendations prior to application.

## 3.2 PREPARATION

- A. Remove all non-essential wood and cellulose containing material from around foundation walls, crawl spaces and porches, etc.
- B. Refer to manufacturer's instructions on package label.
- C. Mix products with water to produce the emulsions on the jobsite.

## 3.3 APPLICATION

- A. Surface Preparation: Remove foreign matter which could decrease effectiveness of treatment on areas to be treated. Loosen, rake and level soil to be treated, except previously compacted areas under slabs and foundations.
- B. Concentrations and Application Rates: Comply with label directions of termiticide, and with State Plant Board or other governing authority specifications and recommendations for the following areas:
  - 1. Under slab-on-grade, sidewalks, platforms, ramps, and paving within the border of roof line.
  - 2. Floor drains and traps.
  - 3. Below expansion joints, control joints, and to all electrical and plumbing conduits and pipes that penetrate the concrete slab.
  - 4. Along both sides of foundation walls, around perimeter of concrete footings, beams, and piers that extend below grade.
- C. Allow not less than 12 hours for drying after application before beginning construction activities.
- D. Post signs in the areas of application warning workers that soil termiticide treatment has been applied. Remove signs when areas are covered by other construction.
- E. Reapply soil treatment solution to areas disturbed by subsequent excavation, landscape grading, or other construction activities following application.

END OF SECTION 2280



## SECTION 02411

## SELECTIVE STRUCTURE DEMOLITION

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 DEFINITIONS

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

## 1.3 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site

## 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Predemolition Photographs or Video: Submit before Work begins.
- C. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

## 1.5 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

## 1.6 QUALITY ASSURANCE

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

## 1.7 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Owners Representative of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Owners Representative and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

## 1.8 WARRANTY

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

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

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

## PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Owners Representative.
- D. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of measured drawings and preconstruction photographs
  - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."

## 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
  - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

## 3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."
  - B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  - C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- 3.4 SELECTIVE DEMOLITION, GENERAL
- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
    1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
    2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
    3. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
    4. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
    5. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal."
  - B. Removed and Salvaged Items:
    1. Clean salvaged items.
    2. Pack or crate items after cleaning. Identify contents of containers.
    3. Store items in a secure area until delivery to Owner.
    4. Transport items to Owner's storage area designated by Owner.
    5. Protect items from damage during transport and storage.
  - C. Removed and Reinstalled Items:
    1. Clean and repair items to functional condition adequate for intended reuse.
    2. Pack or crate items after cleaning and repairing. Identify contents of containers.
    3. Protect items from damage during transport and storage.
    4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
  - D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Owners Representative, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.
- 3.5 DISPOSAL OF DEMOLISHED MATERIALS
- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
    1. Do not allow demolished materials to accumulate on-site.
    2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
    3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
    4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
  - B. Burning: Do not burn demolished materials.
  - C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

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

END OF SECTION 02411

## SECTION 02510

## WATER DISTRIBUTION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. General Conditions
- B. Supplementary Conditions
- C. Division 1
- D. Water Services
- E. Fire-service mains.

## 1.2 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size and dimension requirements of water service piping specialties and are based on specific types and models. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1, section "Substitutions".
- B. Comply with requirements of utility supplying water. Include taping of water mains and backflow prevention.
- C. Comply with NFPA 70, "National Electric Code", for electrical connections between wiring and electrically operated devices.
- D. Comply with NFPA 24 "Private Fire Service Mains and Their Appurtenances."
- E. Provide listing/approval stamp, label or other marking on piping and specialties made to specified standards.
- F. Listing and Labeling: Provide electrically operated specialties and devices specified in this Section that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in NFPA 70, Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.

## 1.3 DELIVERY, STORAGE AND HANDLING

- A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
  - 1. Ensure that valves are dry and internally protected against rust and corrosion.
  - 2. Protect valves against damage to threaded ends and flange faces.
  - 3. Set valves in best position for handling. Set valves closed to prevent rattling.
- B. During storage: Use precautions for valves, including fire hydrants according to the following.
  - 1. Do not remove end protectors, unless necessary for inspection; then reinstall for storage
  - 2. Protect from weather: Store indoors and maintain temperature higher than ambient dew point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
- C. Handling: Use sling to handle valves and fire hydrants whose size required handling by crane or lift. Do not use hand wheels or stems as lifting or rigging points.
- D. Deliver piping with factory supplied end caps. Maintain end caps until ready to install.
- E. Protect stored piping from moisture and dirt.
- F. Protect all flanges, fittings and specialties from moisture and dirt.

## 1.4 PROJECT CONDITIONS

- A. Perform site survey, research public utility records and verify existing utility locations.
- B. Verify that water service piping may be installed to comply with original design and referenced standards, and to the specifications required from the local utility company and local code governing office.

## 1.5 SEQUENCING AND SCHEDULING

- A. Coordinate connection to water main with local utility company.
- B. Coordinate with other utility work.

## PART 2 PRODUCTS

## 2.1 PIPES AND TUBES

- A. General: Applications of pipe and tube materials are indicated in Part 3 "Piping Applications" Article.

## 2.2 PIPE AND TUBE FITTINGS.

- A. General: Applications of pipe and tube fitting materials are indicated in Part 3, "Piping Applications" Article.
- B. Ductile Iron Grooved end Fittings: ASTM A 47, malleable-iron; or ASTM A 536, ductile-iron casting complying with AWWA pipe size, with grooved ends.
- C. Ductile Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical joints ends complying with AWWA C110 or AWWA C 153. Units have two gasketed ball joint sections and one or more gasketed sleeve sections. Include 250 psig minimum working pressure rating.
- D. Ductile Iron, Deflections Fittings: Compound coupling fitting with sleeve and flexing sections, gaskets and restrained joint ends complying with Compound fitting with combination of flanged and mechanical joints ends complying with AWWA C110 or AWWA C 153. Units have two gasketed ball joint sections and one or more gasketed sleeve sections. Include 250 psig minimum working pressure rating Include 250 psig minimum working pressure rating
- E. Ductile Iron Expansion Joints: 3-piece assembly consisting of telescoping sleeve with gaskets and restrained type, ductile iron bell and spigot end sections complying with Compound fitting with combination of flanged and mechanical joints ends complying with AWWA C110 or AWWA C 153. Include 250 psig minimum working pressure rating.
- F. Cast Iron Flanged Fittings: ASME B16.1, Class 125, unless otherwise indicated.
- G. PVC Plastic Fire Service Line: UL1285 and AWWA C900, Include elastomeric seal, ASTM F477.

## 2.3 JOINING MATERIALS

- A. General: Applications of the following piping joining materials are indicated in Part 3, "Piping Applications" Article.
- B. Pipe Couplings: Iron body sleeve assembly, fabricated to match OD of pipes to be joined.
  1. Sleeve: ASTM A 126, Class B, gray iron
  2. Followers: ASTM A 47, malleable iron, or ASTM A 536, Ductile iron.
  3. Gaskets: Rubber
  4. Bolts and Nuts: AWWA C111
  5. Finish: Enamel paint.

## 2.4 VALVES

- A. Rising Stem Gate Valves, 3" NPs and larger: AWWA C500 & AWWA C509, cast iron double disk, bronze disc and seat rings, resilient seated, cast iron or ductile iron body and bonnet, OS&Y, bronze stem, 200 psig working pressure and flanged ends.
- B. Valve Boxes: Cast iron with top section and cover with lettering "WATER", bottom section with base of size to fit over valve and barrel approximately 5" in diameter and adjustable cast iron extension of length required for depth of bury of valve. Provide steel tee handle operating wrench with each valve.
- C. Non-rising Stem Valve, 4 inch MPS and larger, UL 262, FM approved, AWWA approved, iron body and bonnet with flange for indicator post, bronze seating, inside screw, 175 psig. Provide flange ends for pit installation.
- D. Non-rising Metal Gated Valves, 6 inch NPS, AWWA C500, ductile iron body and bonnet with bronze double disc gate and rings, bronze stem, 200 psig working AWWA C550, FM listed.
- E. Double Check Valves and Reduced Pressure Backflow Valves: Must be on Missouri's DNR's list of approved assemblies. Provide as indicated, swing check valves, AWWA C508, 150 psi working pressure. Provide iron body, case iron disc, bolted cap.

## 2.5 HYDRANTS

- A. See plan "P" sheets.
- B. Dry Barrel Fire Hydrant: AWWA C502, (2) 2 ½" NPS and one 4 ½" NPS outlets, 5 ¼" main valve, drain valve and 6" NPS inlet, 250 psig working pressure design. (Color and configuration coordinated with local fire department).

- 2.6 PITS
- A. Provide valve pits as indicated, constructed of precast concrete of size required. Provide access and ladder as required. Provide sleeves for pipe entry and exit, provide water proof sleeve and mechanical link seals. See plan for requirements.
- 2.7 ANCHORAGES
- A. Clamps, straps and washers: ASTM A 506, steel.
- B. Rods: ASTM A 575, steel
- C. Rod Couplings: ASTM A 197, malleable iron.
- D. Bolts: ASTM A 307, steel
- E. Cast Iron Washers: ASTM A 126, gray iron.
- F. Concrete reaction backing: Portland cement concrete mix, 3000 psig
1. Cement: ASTM C 150, Type 1
  2. Fine Aggregate: ASTM C 33, sand.
  3. Coarse Aggregate: ASTM C 33, crushed gravel.
  4. Water: Potable.
- 2.8 IDENTIFICATION
- A. Refer to Division 2 Section "Earthwork" for underground warning tape materials.
- B. Arrange for warning tape made of solid blue film with printed black letter caption, "Caution water line buried below."

### PART 3 EXECUTION

- 3.1 EARTHWORK
- A. Refer to Division 2 Section "Earthwork" for excavation, trenching and backfilling.
- 3.2 PIPING APPLICATIONS
- A. General: Use pipe, fittings and joining methods for piping system according to the following applications.
- B. Transition couplings and special fitting with pressure ratings at least equal to piping pressure rating may be used in applications below unless otherwise indicated.
- C. Do not use flanges or keyed couplings for underground piping.
1. Exception: Piping in boxes, pits or structures, but not buried.
- D. Potable water service piping: See plan "P" sheets.
- E. Fire Protection Water Service Piping: Use the following:
1. 4 – 8 inch NPS: ductile iron, push on joint pipe; ductile iron push on joint fittings; and gasketed joints.
  2. 4 – 8 inch NPS: PVC plastic, Class 150, fire service pipe: PVC plastic fitting and elastomeric seals.
- 3.3 PIPING SYSTEMS – COMMON REQUIREMENTS
- A. General locations and arrangements and additional requirements : See plans and Section 15, "Basic Materials and Methods" and "Plumbing".
- 3.4 PIPING INSTALLATION
- A. Bury piping with depth of cover over top at least 30 inches, with top at least 12" below level of maximum frost penetration and according to the following.
1. In loose gravelly soil and rock: At least 12 inches of additional coverage.
- B. Install piping under streets and other obstructions that cannot be disturbed by tunneling, jacking or combination of both.
- 3.5 ROUGH IN FOR WATER METER
- A. Rough-in piping and specialties for water meter installation according to utility company's written instructions and requirements.
- 3.6 PIT INSTALLATION
- A. Install precast concrete pits according to ASTM C 891.

## 3.7 FIELD QUALITY CONTROL

- A. Piping tests: Conduct piping tests before joints are covered and after thrust blocks have been hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
  - 1. Test at not less than 1-1/2 times working pressure for 2 hours.
- B. Hydrostatic Tests: Increase pressure in 50 psig increments for one hour, decrease to 0 psig. Slowly increase again to test pressure and hold for one more hour. Maximum allowable leakage is 2 quarts per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within above limits.

## 3.8 CLEANING

- A. Clean and disinfect water distribution piping as follows:
  - 1. Purge new water distribution piping systems and parts of existing systems that have been altered, extended or repaired before use.
  - 2. Disinfect water lines in accordance with AWWA C 651.
- B. Prepare reports for purging and disinfecting activities.

END OF SECTION 02510



## SECTION 02520

## PORTLAND CEMENT CONCRETE PAVING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Concrete sidewalks, curbs, gutters and parking areas.

## 1.2 SYSTEM DESCRIPTION

- A. Paving and Base: Designed for parking.

## 1.3 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301. and Section 03001.

## PART 2 PRODUCTS

## 2.1 CONCRETE PARKING BUMPERS

- A. Concrete parking bumper blocks shall be 6'-0" long x 9" wide x 5" high units reinforced with (2) #4 bars. Secure each in position with (2) #4 rebar pins driven into asphalt surface.

## 2.2 MATERIALS

- A. Forms: Wood material, profiled to suit conditions.
- B. Joint Filler: Asphalt impregnated wood fiberboard.
- C. Reinforcing Materials
  1. Reinforcing Steel: ASTM A615; 60 ksi yield grade; deformed billet steel bars, unfinished.
  2. Welded Steel Wire Fabric: Plain type, in flat sheets, unfinished.
  3. Dowels: Plain steel, unfinished.
- D. Concrete Materials
  1. Cement: ASTM C150 Normal Type, Portland type, gray color.
  2. Fine and Coarse Aggregates: ASTM C33.
  3. Water: Clean and not detrimental to concrete.
  4. Admixtures: ASTM C260.
  5. Curing Compound: As specified in Section 03001.
  6. Liquid Surface Sealer: As specified in Section 03001.

## 2.2 CONCRETE MIX

- A. Comply with requirements of Section 03001 for concrete mix design, sampling testing and quality control and as specified below.
- B. Design the mix to produce standard-weight concrete consisting of portland cement, aggregate, air-entraining admixture and water to produce the following properties:
  1. Compressive Strength at 28 days: 4000 psi min.
  2. Slump range: 4" plus or minus 1-1/2".
  3. Air entrainment: 5 to 7 percent
  4. Flexural strength: ASTM C 78, 550 psi minimum at 28 days.

## PART 3 EXECUTION

## 3.1 EXAMINATION AND PREPARATION

- A. Verify gradients and elevations of base.
- B. Verify compacted subgrade, granular base or stabilized soil is ready to support paving and imposed loads.
- C. Moisten substrate to minimize absorption of water from fresh concrete.

## 3.2 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Place joint filler in joints, vertical in position, in straight lines. Secure to formwork.
- C. Place expansion joints at 20 foot intervals. Align joints.

- D. Place joint filler between paving components and other appurtenances.

### 3.3 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade.
- B. Interrupt reinforcement at expansion joints. Place dowels with one end lubricated, the other to bond to concrete.
- C. Place dowels and reinforcement to achieve pavement and curb alignment.

### 3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301. and Section 03001.
- B. Do not disturb reinforcement or formwork components during concrete placement.
- C. Place concrete continuously between predetermined joints.

### 3.5 FINISHING

- A. Sidewalk and walking Surfaces: Light broom, radiused and trowel joint edges.
- B. Curbs and Gutters: Light broom.
- C. Apply curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.
- D. Where concrete curb ramps adjoin vehicle traffic ways, provide detectable warning surface for ramp complying with ADAAG.

END OF SECTION 02520

## SECTION 02530

## SANITARY SEWERAGE

## PART 1 GENERAL

## 1.1 SUMMARY

- A. This section includes sanitary sewerage outside of building.

## 1.2 DEFINITIONS

- A. PE: Polyethylene plastic
- B. PVC: Polyvinyl chloride plastic.

## 1.3 PERFORMANCE REQUIREMENTS

- A. Gravity flow, non-pressure piping pressure ratings: At least equal to system test pressure.

## 1.4 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic structures, pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings and seals from dirt and damage

## 1.5 PROJECT CONDITIONS

- A. Site information: Perform site survey, research public utility records and verify existing utility locations.

## PART 2 PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
  - 1. Gray-Iron Cleanouts:
    - a. Josam Co.
    - b. McWane, Inc.; Tyler Pipe; Wade Div.
    - c. Smith: Jay R. Smith Mfg. Co.
    - d. Watts Industries, Inc.; Ancon Drain Div.
    - e. Watts Industries, Inc.; Enpoco, Inc. Div.
    - d. Zurn Industries, Inc.; Hydromechanics Div.
  - 2. PVC Cleanouts.
    - a. Canplas, Inc.
    - b. IPS Corp.
    - c. NDS, Inc.
    - d. Plastic Oddities, Inc.
    - e. Sioux Chief Mfg. Co. Inc.

## 2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

## 2.2 PIPES AND FITTINGS.

- A. PVC Sewer Pipe and Fittings: According to the following.
  - 1. PVC Sewer Pipe and Fittings: NPS 15 and Smaller: ASTM D 3034, SDR 26, for solvent-cemented or gasketed joints.
    - a. Gaskets; ASTM F 477, elastomeric seals.

## 2.3 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined for non-pressure joints.
  - 1. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
  - 2. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
  - 3. Bands: Stainless steel, at least one at each pipe insert.

- B. Bushing Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for non-pressure joints.
    - 1. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
    - 2. Material for Dissimilar Pipe: Compatible with pipe material being joined.
- 2.4 CLEANOUTS
- A. General: Provide as indicated, pipe extension to grade with ferrule and countersunk cleanout plug.
- PART 3 EXECUTION
- 3.1 EARTHWORK
- A. Excavating, trenching and backfilling are specified in Division 2 Section "Earthwork".
- 3.2 IDENTIFICATION
- A. Materials and their installation are specified in Division 2 Section "Earthwork". Arrange for installing green warning tapes directly over piping.
    - 1. Use warning tape or detectable warning tape over ferrous piping.
- 3.3 PIPING APPLICATIONS
- A. General: Include water tight joints
  - B. Refer to Part 2 of this Section for detailed specifications for pipe and fitting products listed below. Use pipe and fittings and joining methods according to applications indicated.
    - 1. NPS 8: PVC sewer pipe and fittings, solvent-cemented joints or gaskets and gasketed joints.
- 3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS
- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
    - 1. Use the following pipe couplings for non-pressure applications.
      - a. Sleeve type to join piping, of same size, or with small difference in OD.
      - b. Increase/reducer-pattern, sleeve type to join piping of different sizes.
      - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- 3.5 INSTALLATION, GENERAL
- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
  - B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
  - C. Use proper size increases, reduces and couplings where different sizes of materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
  - D. Install gravity-flow piping and connect building's sanitary drains of sizes and in locations indicated, terminate piping as indicated.
    - 1. Install piping pitched down in direction of flow, at minimum slope of 2 percent, unless otherwise indicated.
- 3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION
- A. General: Join and install pipe and fittings according to installations indicated.
  - B. PVC Sewer Pipe and Fittings: As follows:
    - 1. Join pipe and gasketed fittings according to ASTM D 2321.
  - C. System piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
  - D. Install with top surfaces of components, except piping, flush with finished surface, unless indicated otherwise.
- 3.7 CLEANOUT INSTALLATION
- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Install piping so cleanouts open in

- direction of flow in sewer pipe.
- B. Set with tops 1" above surrounding grade.
- C. Set cleanouts in parking lots in cleanout frames and covers in cast-in-place concrete block, 18 by 18 by 12 inches deep.

### 3.8 TAP CONNECTIONS

- A. Make connections to existing piping so finished work complies as nearly as practical with requirements specified for new Work.
- B. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; Install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with a 28 day compression strength of 3000 psi.
- C. Make branch connections from side into existing piping, NPS 4 to NPS 20. Remove section of existing pipe; Install wye fitting into existing piping; and encase entire wye fitting, plus 6-inch overlap, with not less than 6 inches of concrete with a 28 day compression strength of 3000 psi.
- D. Protect existing piping to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.

### 3.11 FIELD QUALITY CONTROL

- A. Clear interior of piping of dirt and superfluous material as work progresses. Maintain swab of drag in piping, and pull past each joint as it is completed.
  - 1. Place plug in end of incomplete piping at end of each day and when work stops
- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again a completion of Project.
  - 1. Submit separate reports for each system inspection.
  - 2. Defects requiring correction include the following:
    - a. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - b. Crushed, broken, cracked or otherwise damaged piping.
    - c. Infiltration: Water leaking into piping.
    - d. Exfiltration: Water leaking from or around piping.
  - 3. Replace defective piping using new materials and repeat inspections until defects are within allowances specified.
  - 4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and part of existing systems that have been altered, extended or repaired, for leaks and defects.
  - 1. Do not enclose, cover or put into service before inspection and approval.
  - 2. Test completed piping systems according to authorities having jurisdiction.
  - 3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice or as required by those authorities having jurisdiction.
  - 4. Submit separate reports for each test.
  - 5. If authorities having jurisdiction do not have published procedures, perform tests as follows:
    - a. Sanitary Sewerage: Perform hydrostatic test.
      - 1) Allowable leakage is maximum of 50 gal. per inch of nominal pipe size per mile of pipe, during a 24 hour period from start of test to end of test.
      - 2) Close opening in system and fill with water.
      - 3) Purge air and refill with water.
      - 4) Disconnect water supply
      - 5) Test and inspect joints for leaks
  - 6. Leaks and loss in test pressure constitute defects that must be repaired.
  - 7. Replace leaking piping using new materials and repeat test until leakage is within allowances specified.

END OF SECTION 02530



## SECTION 02630

## STORM DRAINAGE

## PART 1 GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This section includes storm and downspout drainage outside the building.

## 1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. HDPE: High-density polyethylene.
- C. PVC: Polyvinyl chloride plastic.
- D. RCP: Reinforced concrete pipe.

## 1.4 PERFORMANCE REQUIREMENTS

- A. Gravity flow, non-pressure piping pressure ratings: At least equal to system test pressure.

## 1.5 SUBMITTALS

- A. Product data: For the following
  1. Cleanouts and Drains
  2. Geotextile Fabric
  3. Catch Basins and grates.
- B. Coordination drawings: Show pipe sizes, catch basin sizes, locations and elevations.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Do not store plastic structures, pipe and fittings in direct sunlight.
- B. Protect pipe, pipe fittings and seals from dirt and damage.

## 1.7 PROJECT CONDITIONS

## PART 2 PRODUCTS

## 2.1 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe and fitting materials.

## 2.2 PIPES AND FITTINGS

- A. Corrugated-Steel Pipe: ASTM A 760/A 760M, Type I, made from ASTM A 929/A 929M, zinc-coated steel sheet for banded joints.
  1. Fittings: Fabricated to types indicated and according to same standards as pipe.
  2. Connecting Bands: Standard couplings made for corrugated-steel pipe to form soiltight joints.
- B. Corrugated PE Drainage Tubing and Fittings: AASHTO M 252, Type S, with smooth waterway for coupling joints.
  1. Soiltight Couplings: AASHTO M 252, corrugated, matching tube and fittings to form soiltight joints.
  2. Soiltight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings to form silttight joints.
- C. Corrugated PE Pipe and Fittings: AASHTO M 294, Type S, with smooth waterway for coupling joints.
  1. Soiltight Couplings: AASHTO M 294, corrugated, matching pipe and fittings to form soiltight joints.
  2. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings to form silttight joints.
- D. PVC Sewer Pipe and Fittings: According to the following:
  1. PVC Sewer Pipe and Fittings, NPS 15 and Smaller: ASTM D 3034, SDR 35, for solvent-cemented or

- gasketed joints.
  - a. Gaskets: ASTM F 477, elastomeric seals.
- 2. PVC Sewer Pipe and Fittings, NPS 18 and Larger: ASTM F 679, T-1 wall thickness, bell and spigot for gasketed joints.
  - a. Gaskets: ASTM F 477, elastomeric seals.
- E. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76, Class III, Wall B, for gasketed joints.
  - 1. Gaskets: ASTM 443, rubber.
- F. Reinforced-Concrete Arch Pipe: ASTM C 506, Class IV, for banded joints.
  - 1. Sealing Bands: ASTM C 877, Type I.

## 2.3 SPECIAL PIPE COUPLINGS AND FITTINGS

- A. Sleeve-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric sleeve and band assembly fabricated to mate with OD of pipes to be joined, for nonpressure joints.
  - 1. Sleeve Material for Concrete Pipe: ASTM 443, rubber.
  - 2. Sleeve Material for Plastic Pipe: ASTM F 477, elastomeric seal.
  - 3. Sleeve Material for Dissimilar Pipe: Compatible with pipe materials being joined.
  - 4. Bands: Stainless steel, at least one at each pipe insert.
- B. Bushing-Type Pipe Couplings: ASTM C 1173, rubber or elastomeric bushing fabricated to mate with OD of smaller pipe and ID of adjoining larger pipe, for nonpressure joints.
  - 1. Material for Concrete Pipe: ASTM C 443, rubber.
  - 2. Material for Plastic Pipe: ASTM F 477, elastomeric seal.
  - 3. Material for Dissimilar Pipe: Compatible with pipe materials being joined.
- C. Pressure-Type Pipe Couplings: AWWA C219, iron body sleeve assembly matching OD of pipes to be joined, with AWWA C111 rubber gaskets, bolts, and nuts. Include PE film, pipe encasement.

## 2.4 PE FILM, PIPE ENCASEMENT

- A. ASTM A 674 or AWWA C105; PE film, tube, or sheet; 8-mil thickness.

## 2.5 CONCRETE

- A. General: Cast-in-place concrete according to ACI 318, ACI 350R, and the following:
  - 1. Cement: ASTM C 150, Type II
  - 2. Fine Aggregate: ASTM C 33, sand.
  - 3. Coarse Aggregate: ASTM C 33, crushed gravel.
  - 4. Water: Potable.
- B. Portland Cement Design Mix: 4000 psi minimum, air-entrained, with 0.45 maximum water-cementitious ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.
- C. Structure Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water-cementitious ratio.
  - 1. Include channels in catch basins.
    - a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
      - 1. Invert slope: 2 percent through catch basin.
- D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water-cementitious ratio.
  - 1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain.
  - 2. Reinforcement Bars: ASTM 615/A 615M, Grade 60, deformed steel.

## 2.6 CLEANOUTS

- A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside caulk or spigot connection and countersunk, tapered-thread, brass closure plug. Use units with top-loading classifications according to the following



applications.

1. Light Duty: In earth or grass foot-traffic areas.
  2. Medium Duty: In paved foot-traffic areas.
  3. Heavy Duty: In vehicle-traffic service areas.
  4. Extra-Heavy Duty: In roads.
  5. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast iron soil pipe and fittings.
- B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

## 2.7 DRAINS

- A. Gray-Iron Area Drains: ASME A112.21.1M, round, gray-iron body with anchor flange and round, secured, gray-iron grate. Include bottom outlet with inside caulk or spigot connection, of sizes indicated. Use units with top-loading classifications according to the following applications:
1. Medium Duty: In paved foot-traffic areas.
  2. Heavy Duty: In vehicle-traffic service areas.

## 2.8 PIPE OUTLETS

- A. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
- B. Riprap Basins: Broken, irregular size and shape, graded stone.
1. Average size: NSA No. R-5, screen opening 5 inches.
- C. Filter Stone: NSA No. FS-2, No. 4 screen opening, average size, graded stone.

## PART 3-EXECUTION

### 3.1 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Division 2 Section "Earthwork."

### 3.2 IDENTIFICATION

- A. Materials and their installation are specified in Division 2 Section "Earthwork." Arrange for installing green warning tapes directly over piping and at outside edges of underground structures.
1. Use warning tape or detectable warning tape over ferrous piping.
  2. Use detectable warning tape over nonferrous piping and over edges of underground structures.

### 3.3 PIPING APPLICATIONS

- A. General: Include watertight, silttight, or soiltight joints, unless watertight or silttight joints are indicated.
- B. All piping over 12" shall be class 3 reinforced concrete pipe unless noted otherwise.
- C. Use pipe, fittings, and joining methods according to applications indicated.
- D. Gravity-Flow Piping: Use the following:
1. NPS 4 and NPS 6: Corrugated PE drainage tubing and fittings, soiltight couplings, and coupled joints.
  2. NPS 4 and NPS 6: Corrugated PE drainage tubing and fittings, silttight couplings, and coupled joints.
  3. NPS 4 and NPS 6: PVC sewer pipe and fittings, solvent-cemented joints, or gaskets and gasketed joints.
  4. NPS 8 to NPS 15: Corrugated PE drainage tubing and fittings, soiltight couplings, and coupled joints in NPS 8 and NPS 10. Use corrugated PE pipe and fittings, soiltight couplings, and coupled joints in NPS 12 and NPS 15.
  5. NPS 8 to NPS 15: Corrugated PE drainage tubing and fittings, silttight couplings, and coupled joints in NPS 8 and NPS 10. Use corrugated PE pipe and fittings, silttight couplings, and coupled joints in NPS 12 and NPS 15.
  6. NPS 8 to NPS 15: PVC sewer pipe and fittings, solvent-cemented joints, or gaskets and gasketed joints.
  7. NPS 8 to NPS 15: NPS 12 and NPS 15 reinforced-concrete sewer pipe and fittings, gaskets, and

- gasketed joints. Do not use nonreinforced pipe instead of reinforced concrete pipe in NPS 8 and NPS 10.
- 8. NPS 18 to NPS 36: Corrugated PE pipe and fittings; corrugated, soiltight couplings; and coupled joints.
- 9. NPS 18 to NPS 36: Corrugated PE Pipe and fittings; PE sleeve, silttight couplings; and coupled joints.

### 3.4 SPECIAL PIPE COUPLING AND FITTING APPLICATIONS

- A. Special Pipe Couplings: Use where required to join piping and no other appropriate method is specified. Do not use instead of specified joining methods.
  - 1. Use the following pipe couplings for nonpressure applications:
    - a. Sleeve type to join piping, of same size, or with small difference in OD.
    - b. Increaser/reducer-pattern, sleeve type to join piping of different sizes.
    - c. Bushing type to join piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
- B. Special Pipe Fittings: Use where indicated. Include PE film, pipe encasement.

### 3.5 INSTALLATION, GENERAL

- A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.
- B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab or drag in line, and pull past each joint as it is completed.
- C. Use fittings for branch connections, unless direct tap into existing sewer is indicated.
- D. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- E. Install gravity-flow piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
  - 1. Install piping pitched down in direction of flow, at minimum slope of 1 percent, unless otherwise indicated.
  - 2. Unless written permission is given from Architect, install piping with 36-inch minimum cover.
- F. Extend storm drainage piping and connect to building's storm drains, of sizes and in locations indicated. Terminate piping as indicated.
- G. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.

### 3.6 PIPE JOINT CONSTRUCTION AND INSTALLATION

- A. General: Join and install pipe and fittings according to installation indicated.
- B. Corrugated-Steel Pipe: Join and install according to ASTM A 798. Use standard joints made with coupling bands, unless otherwise indicated.
- C. PE Pipe and Fittings: As follows:
  - 1. Join pipe, tubing, and fittings with couplings for soiltight joints according to manufacturer's written instructions.
  - 2. Install according to ASTM D 2321 and manufacturer's written instructions.
  - 3. Install corrugated piping according to the Corrugated Polyethylene Pipe Association's "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."
- D. PVC Sewer Pipe and Fittings: As follows:
  - 1. Join pipe and gasketed fittings with gaskets according to ASTM D 2321.
  - 2. Install according to ASTM D 2321.
- E. Concrete Pipe and Fittings: Install according to ACPA's "Concrete Pipe Installation Manual." Use the following seals:

1. Round pipe and Fittings: ASTM C 443, rubber gaskets.
  2. Elliptical Pipe: ASTM C 877, Type I, sealing bands.
  3. Arch Pipe: ASTM C 877, Type I, sealing bands.
- F. System Piping Joints: Make joints using system manufacturer's couplings, unless otherwise indicated.
- G. Join piping made of different materials or dimensions with couplings made for this application. Use couplings that are compatible with and that fit both systems' materials and dimensions.
- 3.7 STORM DRAINAGE INLET AND OUTLET INSTALLATION
- A. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
  - B. Construct riprap of broken stone, as indicated.
  - C. Install outlets that spill onto grade, anchored with concrete, where indicated.
  - D. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
  - E. Construct energy dissipaters at outlets, as indicated.
- 3.8 CONCRETE PLACEMENT
- A. Place cast-in-place concrete according to ACI 318 and ACI 350R.
- 3.9 DRAINAGE SYSTEM INSTALLATION
- A. Assemble and install components according to manufacturer's written instructions.
  - B. Assemble and install stainless-steel drainage systems according to ASME A112.3.1 and manufacturer's written instructions.
  - C. Install with top surfaces of components, except piping, flush with finished surface.
  - D. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
  - E. Embed channel sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
  - F. Fasten grates to channel sections if indicated.
  - G. Assemble trench sections with flanged joints.
  - H. Embed trench sections and drainage specialties in 4-inch minimum concrete around bottom and sides.
  - I. Make piping connections and install stainless-steel piping with gasketed joints between system components.
- 3.10 CLEANOUT INSTALLATION
- A. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
  - B. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.
  - C. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.
- 3.11 DRAIN INSTALLATION
- A. Install type of drains in locations indicated.
  - B. Embed drains in 4-inch minimum depth of concrete around bottom and sides.
  - C. Fasten grates to drains if indicated.
  - D. Set drain frames and covers with tops flush with pavement surface.
- 3.12 FIELD QUALITY CONTROL
- A. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed.
    1. In large, accessible piping, brushes and brooms may be used for cleaning.
    2. Place plug in end of incomplete piping at end of day and when work stops.
    3. Flush piping between structures to remove collected debris, if required by authorities having jurisdiction.

- B. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of project.
1. Submit separate reports for each system inspection.
  2. Defects requiring correction include the following:
    - a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    - b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    - c. Crushed, broken, cracked, or otherwise damaged piping.
    - d. Infiltration: Water leakage into piping.
    - e. Exfiltration: Water leakage from or around piping.
  3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
  4. Reinspect and repeat procedure until results are satisfactory.
- C. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
1. Do not enclose, cover, or put into service before inspection and approval.
  2. Test completed piping systems according to authorities having jurisdiction.
  3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours advance notice.
  4. Submit separate reports for each test.
  5. Leaks and loss in test pressure constitute defects that must be repaired.
  6. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

END OF SECTION 02270

## SECTION 02740

## ASPHALTIC CONCRETE PAVING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. General Conditions
- B. Supplementary Conditions
- C. Division 1
- D. Asphaltic concrete paving

## 1.2 QUALITY ASSURANCE

- A. Perform Work in accordance with Department of Planning, Engineering & Permits City of Joplin, MO.
- B. Comply with AI's "The Asphalt Handbook," except where more stringent requirements are indicated.
- C. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- D. Manufacturer's Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.

## 1.3 ENVIRONMENTAL REQUIREMENTS

- A. Do not place asphalt when ambient or base surface temperature is less than 40 degrees F or base surface is wet or frozen.

## PART 2 PRODUCTS

## 2.1 PAVEMENT MATERIALS

- A. Aggregates:
  - 1. Use material and gradations that have performed satisfactorily in previous installations.
  - 2. Course Aggregate: Sound; angular crushed stone; crushed gravel; or properly cured, crushed blast furnace slag, complying with ASMT D 692.
  - 3. Fine Aggregate: Sharp-edged natural sand or sand prepared from stone; gravel, properly cured blast furnace slag, or combinations thereof, complying with ASTM D 1073.
    - 1. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
  - 4. Mineral Filler: Rock, or slag dust, hydraulic cement, or other inert material complying with ASMT D 242.
- B. Asphalt Materials:
  - 1. Asphalt Cement: ASTM D 3381 for viscosity-graded material; ASTM D 946 for penetration-graded material.
  - 2. Prime Coat: Asphalt emulsion prime conforming to state DOT requirements.
  - 3. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting factory diluted in water, of suitable grad and consistency for application.
  - 4. Water: Potable.

## 2.2 ASPHALT PAVEMENT MIX

- A. Use dry material to avoid foaming. Mix uniformly.
- B. Provide dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types".
  - 1. Provide mixes with a history of satisfactory performance in geographical area where Project is located.

## 2.3 STRIPING MATERIALS

- A. Striping Paint specifically designed & listed for striping of parking lots.
  - 1. Alkyd-resin type, ready-mixed, complying with FS TT-P-115, Type 1 or AASHTO M-248, Type N.

- a) Color: White

### PART 3 EXECUTION

#### 3.1 EXAMINATION AND PREPARATION

- A. Verify gradients and elevations of base.
- B. Verify compacted or modified sub grade is dry and ready to support paving and imposed loads.

#### 3.2 PLACING ASPHALTIC PAVEMENT

- A. Apply asphalt primer in accordance with Department of Planning, Engineering & Permits City of Joplin, Missouri standards.
- B. Place bituminous mixtures with a spreading and finishing machine, to the typical cross-section shown.
  - 1. Place mixture in strips not less than 10 feet wide.
  - 2. Place mixture around obstacles and in small areas by hand tools.
- C. Compacted Thickness:
  - 1. Aggregate Base Course: 6 inches.
  - 2. Asphalt Course: 2 inches.
- D. Joints:
  - 1. Coat the contact surfaces of curbs, gutters, manholes and similar structures, with asphalt prior to placing the asphalt mixture against them.
  - 2. Make construction joints between successive day's work by use of wooden headers or by cutting back previously laid material full depth to expose a fresh surface. Coat contact surface of previously placed material with asphalt.

#### 3.3 COMPACTION

- A. General: Begin rolling when mixture will bear roller weight without excessive displacement. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips.
  - 1. Complete compaction before mix temperature cools to 185 degrees F.
- B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
- C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, hot material.
- D. Intermediate Rolling: Follow breakdown rolling as soon as possible while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
  - 1. Average Density: 96 percent of reference laboratory density according to ASTM D 1559, but not less than 94 percent nor greater than 100 percent.
- E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

#### 3.4 PATCH AND REPAIR

- A. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cutout such areas and fill with fresh, hot asphalt concrete. Compact by rolling to a maximum surface density and smoothness.

#### 3.5 PROTECTION

- A. Protection: After final rolling, do not permit Vehicular traffic on pavement until it has cooled and hardened.
- B. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

#### 3.6 FIELD QUALITY CONTROL

- A. General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect.
- B. Tolerances:
  - 1. Flatness: Determined by using a 10" straight edge applied transversely or longitudinally to paved areas.
    - a) Base coarse: Maximum variation of 1/4"
    - b) Asphalt course: Maximum variation of 1/8"

2. Compacted Scheduled Thickness: Within 1/4" of design thickness.
  - a) Areas that pond water shall be removed and replaced at no additional cost to owner.
3. Paving to not take place until construction is complete unless approved in writing by the Design/Builder.
4. At time or substantial completion, asphalt paving shall be clean and free of debris.

3.7 APPLICATION OF STRIPING

- A. Do not apply pavement marking until layout and color and placement has been verified by Design/Builder.
- B. Allow pavement to cure for 30 days before starting pavement marking.
- C. Minimum of 2" wide stripes located as indicated on plans.
- D. Paint Handicapped symbol as indicated on plans.

END OF SECTION 02740





## SECTION 02920

## SEEDING

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. General Conditions
- B. Supplementary Conditions
- C. Division 1
- D. Preparation of soil, placement of seed, and fertilizer

## 1.2 SUBMITTALS

- A. Seed vendors certified statement for grass seed mixture, stating botanical and common name, percentages by weight of purity, germination, and weed seed.

## PART 2 PRODUCTS

## 2.1 GRASS MATERIALS

- A. Seed Mixture: Fresh, clean new-crop seed complying with Official Seed Analysts of North America requirements for purity and germination.
  - 1. 50% K-31 Fescue
  - 2. 30% Kentucky Blue Grass
  - 2. 20% perennial ryegrass
- B. Fertilizer: Nitrogen 1lb per 1000 sq. ft, phosphoric acid, 4 percent, potassium, 2 percent.
- C. Anti-erosion Mulch: Clean, seed free hay or threshed straw.

## PART 3 EXECUTION

## 3.1 EXAMINATION AND PREPARATION

- A. Prepare subsoil to eliminate uneven areas. Maintain profiles and contours. Make changes in grade gradual. Blend slopes into level areas.
- B. Apply fertilizer in accordance with manufacturer's instructions.

## 3.2 SEEDING

- A. Apply seed with spreader or seeding machine at a rate of 3 to 4lb per 1000 sq ft evenly in two directions at right angles to each other.
  - 1. Do not use wet seed or seed that is moldy or otherwise damaged.
- B. Rake seed lightly into top 1/8 inch of soil, and roll lightly
- C. Immediately following seeding, apply agricultural mulch or threshed straw to seeded areas.
- D. Apply water with a fine spray immediately after each area has been mulched.
- E. Erect barricades and warning signs as required to protect newly seeded areas from traffic.

END OF SECTION 02920



**DIVISION 3      CONCRETE**

03001      Concrete  
03366      Chemically Stained Concrete

03300-1 to 7  
03366-1 to 3



## SECTION 03001

## CONCRETE

## PART A. GENERAL

## A.1 SECTION INCLUDES

- A. Formwork, Reinforcement, Accessories, Cast-in-place concrete, Finishing and curing.

## A.2 SUBMITTALS: Comply with Section 01300

- A. Shop Drawings: Submit to the Architect for review prior to installation, shop drawings of all reinforcing steel, including bar cutting lists, construction of forms including jointing, reveals, location and pattern of form tie placement and construction/expansion joint placement schedule with details.
- B. Prior to placement of concrete, submit concrete mix designs proposed by the concrete supplier, for class of concrete, including recent test results substantiating the quality of concrete produced by each mix.
- C. Weekly reports of all compression, slump and air content tests from the testing laboratory.
- D. Provide a set digital pictures on a CD for the owners record of all concrete reinforcement, anchor bolts, chases, sleeves, insulation, and step footings/walls, after inspection by the building inspector having jurisdiction over the project and before placement of concrete.
  - 1. Supply pictures of the type and minimum quality listed below.
    - a. JPEG image, 5 mega pixel or better set to the largest format possible.
    - b. Image must clearly show all items that will be hidden from view when project is completed. Pictures taken with a telephone camera will not be accepted.
    - c. Pictures must be original pictures unedited, cropped or altered in any way.
  - 2. Supply a legend for the pictures to clarify the date, location, and direction in which the picture was taken.
  - 3. Submittal of these pictures to be part of project completion and are required before final payment will be processed.

## A.3 QUALITY ASSURANCE

- A. Reference Standards and Specifications: Comply with the provisions of the following specifications and standards, except as otherwise noted or specified, or as directed by the Architect during unusual climatic conditions.
  - 1. ACI 301, "Specifications for Structural Concrete for Buildings."
  - 2. ACI 318, "Building Code Requirements for Reinforced Concrete."
  - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."

## A.4 TESTS

- A. Testing of concrete cylinders to determine compressive strength of concrete delivered to the job site, shall be performed by an independent testing laboratory approved by the Architect. Tests shall be paid for by the Contractor.
- B. Testing requirements are specified in FIELD SAMPLING AND TESTING paragraph in this section.

## PART B. PRODUCTS

## B.1 FORM MATERIALS AND ACCESSORIES

- A. For Exposed Finished Concrete: Plywood, metal, or other acceptable panel-type material, to provide continuous, straight, smooth, exposed surfaces.
- B. For Unexposed Finish Concrete: Use plywood, lumber, metal or other acceptable material. If lumber is used, it must be dressed on at least 2 edges and 2 sides for a tight fit.
- C. Form Coatings: Commercial formulation form coating compound that will not bond with, stain, nor adversely affect concrete surfaces, will not impair subsequent treatments or finishes requiring bond or adhesion, nor impede wetting of concrete surfaces by water or curing compound.

## 2.2 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A615(S1), deformed billet steel bars of grades as indicated on the structural drawings, free from loose rust, scale and other coatings that may reduce bond.
- B. Welded Steel Wire Fabric: ASTM A185, welded wire fabric, of sizes and types as indicated on the drawings.
- C. Accessories: Include spacers, chairs, ties and other devices necessary for properly spacing and fastening reinforcing in place. Use plastic protected reinforcing bar supports conforming with CRSI Class 1 specification for exposed finish concrete. Support reinforcing steel in footings with concrete brick or plastic protected reinforcing bar supports.
- D. Tie Wires: Soft annealed iron wire not smaller than 18 gage.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Normal Type I.
- B. Fine Aggregates: Clean, sharp, natural or manufactured sand, free from loam, clay, lumps or other deleterious substances.
- C. Course Aggregates: Clean, uncoated, processed, locally available aggregate, containing no clay, mud, loam or foreign matter; maximum size of 1-1/2".
- D. Mixing Water: Clean, free from oil, acid, salt, injurious amounts of vegetable matter, alkalis and other impurities; potable.
- E. Air Entrainment Admixture: ASTM C260, 5% - 7%.
- F. Other Admixtures: Do not use other admixtures unless accepted by Architect.

## 2.4 MISCELLANEOUS MATERIALS

- A. Connectors: Provide all metal connectors required for placement in cast-in-place concrete, for the attachment of structural and non-structural members.
- B. Expansion Joint Filler: ASTM D 1751, non-extruding pre-moulded material, 1/2" thick, unless otherwise noted, composed of fiberboard impregnated with asphalt, except use ASTM D 1752, Type II, resin-bound cork for walks and other exposed areas.
- C. Curing Compound: ASTM C 309; Sonneborn "Kure-N-Seal", Euclid "Rez-Seal" or L & M "Dress & Seal 18".
- D. Vapor Barrier: Polyethylene film, .006" thick (minimum .02856 lbs. per sq. ft. and 57.1 lbs. plus or minus 3% per 20' x 100' roll); Visqueen or approved equal.
- E. Concrete Sealer: Sonneborn "Son-No-Mar", L & M "Super Seal 35" or Euclid "Eucopoxy I".
- F. Non-Shrink Grout: CRD-C 621, factory pre-mixed grout.
  - 1. Metallic: Master Builders "Embedco 636", Sonneborn "Ferrolith GDS", Euclid "Hi-Mod Grout" or L & M "Ferrogout".
  - 2. Non-Metallic: Master Builders "Set Grout", Sonneborn "SonogROUT", Euclid "Euco-NS" or L & M "Crystex".
- G. Bonding Agent: Polyvinyl acetate, rewettable type; Sonneborn "Sonocrete", Euclid "Euroweld" or L & M "Everbond".

## 2.5 CONCRETE MIX

- A. Mix and deliver concrete in accordance with ASTM C94, Alternative 3.
- B. Strength: Concrete minimum ultimate strength at 28 days as noted on structural drawings and as specified.
- C. Mix Design:
  - 1. Prepare design mixes for each type of concrete, in accordance with ACI 301 and ACI 318, except as otherwise specified.
  - 2. Proportion design mixes by weight for class of concrete required, complying with ACI 211, except as otherwise specified.
- D. Provide test results from the concrete supplier for proposed design mix, to establish the following:
  - 1. Gross weight and yield per cu. yd. of trial mixtures.
  - 2. Measured slump.
  - 3. Measured air content.
  - 4. Compressive strength developed at 7 days and at 28 days, from not less than 3 test cylinders cast for each 7-day and 28-day test, and for each design mix.
- E. Submit written reports to the Architect for design mix at least 15 calendar days prior to the start of work.
- F. Use air-entrained admixture in strict compliance with manufacturer's directions.

## PART C. EXECUTION

## C.1 FORMWORK ERECTION

- A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads and static and dynamic loads that might be applied until such loads can be supported by the concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position.
- B. Construct forms in accordance with ACI 347, to sizes, shapes, lines and dimensions indicated, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, molding, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.
- C. Fabricate forms for easy removal without hammering or prying against the concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces.
- D. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous location.
- E. Chamfer exposed corners and edges 3/4" unless otherwise indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.
- F. Form Ties: Factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal.
- G. Preparation of Form Surfaces: Coat the contact surfaces of forms with a form-coating compound where applicable before reinforcement is placed.
- H. Provisions for Other Trades: Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such ties. Accurately place and securely support items built into form.
- I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed. Retighten forms after concrete placement, if required, to eliminate mortar leaks.

## C.2 REINFORCEMENT PLACEMENT

- A. Where reinforcing is not specified, provide minimum of #4 bars at 12"oc each way for first 12" of concrete thickness and same again for each additional 8" of concrete thickness, or, as directed by Architect.
- B. Comply with the Concrete Reinforcing Steel Institute (CRSI) "Recommended Practice for Placing Reinforcing Bars", and as herein specified.
- C. Ensure reinforcing is clean, free of loose scale, dirt, or other materials or coatings which reduce or destroy bond with concrete.
- D. Accurately position, support and secure reinforcement against displacement. Locate and support reinforcing by chairs, spacers and hangers as required. Set wire ties so ends are pointed into concrete.
- E. In all cases, provide minimum concrete protection over reinforcement at least equal to the bar diameter. Where concrete is to be adjacent to earth, provide minimum protection of 1-1/2" and where concrete is to bear on earth provide minimum 3" clearance.
- F. Do not place bars more than 2" beyond the last leg of continuous support. Do not use supports to hold runways for conveying equipment. Laps for reinforcing bars shall be 40 bar diameters or 24", whichever is greater.

## C.3 JOINTS AND INSERTS

- A. Construction Joints: Provide control and expansion joints. Locate and install joints, which are not shown on the drawings, so as not to impair the strength and appearance of the structure. Submit joint schedule to the Architect.
- B. Inserts: Set and build into the work, anchorage devices and other embedded items required for other work that is attached to, or supported by, concrete. Properly locate embedded items in cooperation with other trades and secure in position before concrete is poured. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.

- C.4 CONCRETE PLACEMENT: Comply with ACI 304, and as herein specified.
- A. Notify Architect 24 hours before placing any concrete.
  - B. Pre-Placement Inspection: Before placing concrete, clean and inspect formwork, reinforcing steel and items to be embedded or cast-in. Notify other crafts in ample time to permit the installation of their work and cooperate with them in setting such work as required. Make sure termite control treatment has been applied before vapor barrier and concrete are installed. Coordinate the installation of joint materials and vapor barriers with placement of forms and reinforcing steel.
  - C. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.
  - D. Install vapor barrier under interior slabs on grade. Apply directly over base rock. Lap joints minimum 6 inches and seal watertight. Lay vapor barrier just before reinforcement is placed and concrete is poured. Protect against punctures. Repair damaged vapor barrier with vapor barrier material, lap over damaged areas minimum 6 inches and seal watertight.
  - E. Conveying: Convey concrete from the mixer to the place of final deposit by methods which will prevent the separation or loss of materials. Provide equipment for chuting, pumping and pneumatically conveying concrete of proper size and design as to insure a practically continuous flow of concrete at the point of delivery and without segregation of the materials. Keep open troughs and chutes clean and free from coatings of hardened concrete. Do not allow concrete to drop freely more than 5 feet. All equipment and methods used for conveying are subject to the approval of the Architect.
  - F. Depositing: Deposit concrete continuously or in layers of such thickness that no concrete will be placed on hardened concrete so as to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as directed by Architect. Deposit concrete near or in its final location to avoid segregation due to re-handling or flowing, and displacement of the reinforcement.
  - G. Cold Weather Placing: Comply with the requirements of ACI 306.
  - H. Hot Weather Placing: Comply with the requirements of ACI 305.
  - I. Place concrete continuously between predetermined expansion, control and construction joints. Do not break or interrupt successive pours such that cold joints occur.
  - J. Compaction: Consolidate concrete during placing operations by vibrating when necessary and otherwise so that concrete is thoroughly worked around reinforcement and other embedded items and into corners and so that honeycomb condition is eliminated.
  - K. Place floor slabs in saw cut pattern indicated and with control joints at 20 foot intervals maximum both directions.
  - L. Where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and epoxy in place or pack with non-shrink grout as directed by Architect.
  - M. Screed slabs-on-grade and base for toppings level. In rooms or areas with drains in floor, provide uniform 1% slope in floor surface to drains.
- C.5 FIELD SAMPLING AND TESTING: The following samples and tests will be performed by an independent testing laboratory approved by the Architect. Refer to paragraph 1.4 TESTS, for responsibility of payment for tests.
- A. Samples:
    - 1. Field samples shall be made and cured in accordance with ASTM C 31, for each concrete strength, at the rate of 4 test cylinders and one slump test for each 50 cubic yards of concrete from each day's pour.
    - 2. Test cylinders as follows: one at 7 days, two at 28 days, and reserve the remaining for testing after a longer period as required by the architect, if the 28 day tests do not meet the required strength. In accordance with ASTM c 173 Volumetric Method, or ASTM C 231 pressure Method, make air content check for each set of test cylinders.
    - 3. The taking of samples from small pours of 10 cubic yards or less may be omitted with permission of the Architect.
    - 4. When early form removal is requested, field cure cylinders tested at 7 or less days to determine sufficient strength.



- B. Testing:
1. Where strength of any group of 3 cylinders or of any individual cylinder fall below minimum compressive strength specified, the Architect shall have the right to require that test specimens be cut from the structure. Specimens shall be selected by Architect from location in structure represented by test specimen of specimens which failed.
  2. Specimens shall be secured, prepared, and tested in accordance with ASTM X 42, within a period of 60 days after placing concrete.
  3. Concrete shall be considered to meet the strength requirements of paragraph 4.8.4 of ACI 318.
  4. Should laboratory analysis indicate that the proper concrete mix has not been used by the Contractor, all such concrete poured using the improper mix shall be subject to rejection.
  5. The cost of cutting specimens from the structure, patching the resulting holes, and making the laboratory analysis shall be borne by the Contractor.
  6. The holes from which the cored samples are taken shall be packed solid with no slump concrete proportioned in accordance with the ACI 211 "Recommended Practice for selecting Proportions of No-Slump Concrete". The patching concrete shall have the same design strength as the specified concrete.
  7. If any of the specimens cut from the structure fail to meet the requirements outlined in paragraph 4.8.4 of ACI 318, the Architect shall have the right to require any and all defective concrete to be replaced, and all costs resulting therefrom shall be borne by the Contractor.
- C. Contractor Sampling: In addition to the slump tests specified above, the contractor shall keep a cone (mold) and rod apparatus on the job site for random testing of batches. When concrete does not meet the specified slump requirements, and when directed by the Architect, immediately perform a slump test in accordance with ASTM C 143. Concrete not meeting the slump requirements shall be removed from the job site.
- C.6 FINISH OF FORMED SURFACES: All formed concrete surfaces exposed to view and not otherwise specified to be treated, shall be provided with smooth rubbed finish.
- A. Rough Form Finish: For formed concrete surfaces not exposed-to-view in the finish work or by other construction, unless otherwise indicated. Concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or ground off.
  - B. Smooth Form Finish: For formed concrete surfaces that are to be covered with a coating material applied directly to the concrete, such as waterproofing, damproofing, painting or other similar system. Cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.
  - C. Smooth Rubbed Finish: For all concrete surfaces which are to be exposed to view, and are not indicated to be finished otherwise, provide a smooth rubbed finish by first applying Smooth Form Finish treatment not later than one day after form removal and then immediately afterward as follows: Moisten concrete surfaces and rub smooth with carborundum brick or other abrasive until uniform color and texture is produced. Do not apply cement grout other than that created by rubbing process.
- C.7 SLAB FINISHES:
- A. Exposed Plain Concrete Finish: Finish concrete by forcing aggregate away from surface and screeding at proper level. Float surface and lightly trowel. When concrete has set sufficiently to ring under trowel, give a second troweling to produce a smooth, dense surface free from trowel marks and sweeps, air bubbles or other imperfections of troweling.
  - B. Slabs To Receive Floor Covering: Finish as in A. above, trowel to remove trowel marks and to a smooth, even finish, except omit second troweling.
  - C. Non-Slip Broom Finish: Provide light broom finish in order to produce non-slip surface.
  - D. Concrete Sealer: Apply minimum two coats in accordance with manufacturer's instructions or as many coats as necessary to provide completely sealed surface with uniform glossy surface.

## C.8 CONCRETE CURING AND PROTECTION:

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting, keep continuously moist for not less than 7 days. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least 7 days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by moist curing, by moisture-retaining cover, by curing and sealing compound, and by combinations thereof, as specified.
1. Provide moisture curing by keeping concrete surface continuously wet by covering with water, by water-fog spray, or by covering concrete surface with specified absorptive cover, thoroughly saturating over with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.
  2. Provide moisture-cover curing by covering concrete surface with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  3. Provide curing and sealing compound on interior slabs to receive resilient flooring, or left exposed; and to exterior slabs, walks, and curbs, as follows:
    - a) Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
    - b) Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, waterproofing, flooring (glue-down carpets), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
- C. Curing Formed Surfaces: Cure formed concrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.
- D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs and other flat surfaces by application of appropriate curing compound. Final cure concrete surfaces by moisture-retaining cover, unless otherwise directed.

## C.9 PROTECTION

- A. No wheeling, working, or walking on finished surfaces will be allowed for 16 hours after the concrete is placed.
- B. Provide plywood or other acceptable protective cover at all traffic areas throughout the job.
- C. Protect exposed concrete floors, steps and walks from paint, dirt or mud and other debris, materials or equipment which may stain, mar or damage these surfaces.

## C.10 REMOVAL OF FORMS:

- A. Do not remove forms until the concrete has attained 67% of 28 days strength or a minimum of 4 days. Use a method of form removal which will not cause overstressing of the concrete.

## C.11 MISCELLANEOUS ITEMS:

- A. Fill in holes and openings left in concrete for the passage of work by other trades after their work is in place. Mix, place, and cure concrete to blend with in-place construction. Provide all other miscellaneous concrete filling required to complete work.

## C.12 CONCRETE SURFACE REPAIRS:

- A. Repair and patch defective areas with cement mortar of the same type and class as the original concrete, immediately after removal of forms. Cut out honeycomb, rock pockets, voids over 1/2" diameter, and holes left by tie rods and bolts, down to solid concrete but in no case to a depth of less than 1". Make edges of cuts perpendicular to the concrete surface, before placing cement mortar in the same manner as adjacent concrete. Proprietary patching may be used when acceptable to the Architect.

- B. Smooth, Exposed-To-View Surfaces: Blend cements so that, when dry, patching mortar will match color of surrounding concrete. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.
  - C. Concealed Formed Surfaces: Repair defects that adversely affect the durability of the concrete. If defects cannot be repaired remove and replace the concrete.
  - D. Other repair methods may be used, subject to Architect's acceptance.
- C.13 CLEAN-UP:
- A. Do not allow debris to accumulate. Clean up all concrete and cement materials, equipment and debris upon completion of any portion of the concrete work, and upon completion of the entire cast-in-place concrete work.
- C.14 FORM REMOVAL
- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
  - B. Remove formwork progressively and in accordance with code requirements.
  - C. Apply bonding agent base course in accordance with manufacturer's instructions.
- C.15 FLOOR FINISHING
- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
  - B. Uniformly spread, screed, and float concrete.
  - C. Steel trowel surfaces which will receive carpeting, resilient flooring or which will be left exposed.
  - D. Maintain surface flatness, with maximum variation of 1/8 inch 10 ft.
  - E. In areas with floor drains, maintain floor level at walls and slope surfaces uniformly to drains.
- C.16 CURING
- A. Apply sealer on floor surfaces in accordance with manufacturer's instructions.
  - B. Immediately after placement, protect concrete from premature drying.
  - C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C.17 FORMED SURFACES
- A. Provide concrete surfaces to be left exposed smooth rubbed finish.
- C.18 DEFECTIVE CONCRETE
- A. Modify or replace concrete not conforming to required lines, details and elevations or specifications as directed by Architect/Engineer.

END OF SECTION 03001



## SECTION 03366

## CHEMICALLY STAINED CONCRETE

## PART 1. GENERAL

## 1.1 SUMMARY:

- A. Section Includes:
  - 1. Chemically stained concrete floor finish
  - 2. Seal coat
- B. Related Sections:
  - 1. Section 03300-Cast-In-Place Concrete
- C. Note: Refer to drawings for all saw-cut joints.

## 1.2 SUBMITTALS

- A. Contactor shall submit specified manufacturer's complete technical data sheets for all products to be used, including installation instructions and selected color information.

## 1.3 QUALITY ASSURANCE:

- A. Manufacturer Qualifications: Manufacturer of specified stain and sealer shall have a minimum 10 years experience in the production of the specified products.
- B. Contractor Qualifications: Contractor must have a minimum 3 years experience in staining applications and successfully completed not less than 6 projects comparable in scale and complexity.
  - 1. Statement of Contractor Qualifications
    - a. Submit list of at least 6 comparable projects including project name, project address and owner contact information.
- C. Regulatory Requirements
  - 1. Products shall comply with the United States Clean Air Act for maximum Volatile Organic Compound (VOC) content as specified in PART 2 of this section.
- D. Mockups and Field Samples: Prepare field sample at project site for Architect's review and approval.
  - 1. Samples shall be constructed on site and shall be 5' x 5'. Samples will be manufactured until the Architect's desired outcome has been achieved. Joints are to be caulked.
  - 2. Construct sample using processes and techniques intended for use on permanent work, including curing procedures. Includes samples of control, construction, and expansion joints in sample panels. If product representative does the sample work, the concrete installer must be present to review technique.
  - 3. Sample shall be stained and sealed by the individual workers who will actually be performing the work for the project.
  - 4. Obtain written approval of the sample from project Architect before start of work.
  - 5. Retain approved samples through completion of the work for use as a quality standard for finished work.
  - 6. If finished concrete does not match approved concrete sample, the contractor is liable for any redesign of selected color palette.

## 1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver the specified products in original, unopened containers with legible manufacturer's identification and information.
- B. Store specified products in conditions recommended by the manufacturer.

## 1.5 JOB SITE CONDITIONS

- A. Environmental Conditions: Maintain an ambient temperature of between 50 degrees F and 90 degrees F during application and at least 48 hours after application.
- B. Protection: Precautions shall be taken to avoid damage or contamination of any surfaces near the work zone.
  - 1. Protect completed stain work from moisture or contamination.

## PART 2 PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Floor stain:
  - 1. Chemical stain shall be a reactive solution of metallic salts which react with the calcium hydroxide in the cured concrete substrate to produce permanent, variegated or translucent color effects.
  - 2. Provide CCI Acid Stain by Concrete Coatings Inc., 800-443-2871, which is considered to conform to the requirements of this specification.
    - a. Approved Substitutions:
      - 1. Equal stain product by Kemiko Concrete Products, 800-875-4596
      - 2. Equal "Lithochrome" product by L.M. Scofield Company, 800-800-990.
  - 3. Stain Colors:
    - a. Stain Color #1: Equal to Kemiko Concrete Products Acid Stain; color: English Red Stain
    - b. Stain Color #2: Equal to Kemiko Concrete Products Acid Stain; color: Black Stain
    - c. Refer to drawings for locations of each color.
- B. Sealer:
  - 1. Sealer shall be equal to "Granicrete Color Enhancer Clear Sealer Natural" by Kemiko Concrete Products.
    - a. Approved Substitutions:
      - 1. Equal sealer product by concrete Coatings Inc. (CCI) and L.M. Scofield Company.
- C. Control Joints:
  - 1. For sealing control joints, use product as recommended by Concrete Coatings, Inc. and follow manufacturer's instructions.
- D. Substitutions:
  - 1. The use of any products other than those specified will be considered provided that the contractor requests its use in writing within seven (7) days prior to bid date. This request shall be accompanied by:
    - a. A certificate of compliance from the material manufacturer stating that the proposed products meet or exceed the requirements for this specification.
    - b. Documented proof that the proposed material has a five (5) year proven record of performance for staining concrete substrates, confirmed by at least one (1) local project that the Architect can examine.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verification of Conditions: Contractor shall examine areas and conditions under which work will be performed and identify conditions detrimental to proper and timely completion of work. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. New Concrete
  - 1. Newly placed concrete should be sufficiently cured to allow the concrete to become reactive, a minimum of 28 days.
  - 2. Liquid curing materials shall not be used.
  - 3. All surfaces should be cured by the same method and different sections (pours) chemically stained when the concrete is the same age.
  - 4. Immediately prior to chemically staining, the concrete must be thoroughly cleaned.
    - a. Follow manufacturer's instructions for cleaning.
    - b. Allow floor to dry completely prior to application of floor stain.

**3.3 APPLICATOIN OF CHEMICAL STAIN**

- A. All concrete surfaces must be dry and properly prepared as described above. Surrounding areas must be protected from over-spray, run-off and tracking. The surface should be divided into small work sections using wall, joint lines, or other stationary breaks as natural stopping points.
- B. Follow manufacturer's instructions and guidelines in applying chemical stain. Generally, stain should be applied full strength (undiluted) at the coverage rate recommended by the manufacturer and using application equipment described in the manufacturer's printed technical literature. The color of the liquid chemical stain will have no resemblance to the final color produced on the concrete substrate.
- C. Chemical stains normally fizz when reacting with the concrete. If fizzing does not occur, the substrate has not been adequately prepared or the concrete has too low of a pH level. If this should happen, contact the local representative for further recommendations.
- D. The chemical stain should be transferred to the substrate by nonmetallic brush or acid-resistant pump sprayer and immediately scrubbed into the surface.
- E. When multiple coats of one or more colors are required, washing and drying between colors is desirable to evaluate the color prior to the next coat.
- F. After the final coat of chemical stain has remained on the surface for a minimum of four (4) hours, all residue must be removed by wet scrubbing with a commercial grade detergent. The surface must be rinsed after scrubbing until the rinse water is completely clean. Run off may stain the adjacent areas or harm plants. It should be collected by wet vacuuming or absorbed with an inert material.
- G. Allow to dry completely, at least 24 hours or as recommended by manufacturer, before applying protective sealer.

**3.4 APPLICATION OF SEALER**

- A. Allow the concrete to completely dry.
- B. The surface shall be sealed with the specified sealer(s) produced by the chemical stain manufacturer.
- C. Apply sealer according to manufacturer's instructions, using recommended method.

**3.5 PROTECTON**

- A. Protect floor from traffic for at least 72 hours after final application of sealer.

**3.6 MAINTENANCE**

- A. Chemically stained and sealed floors should be maintained by sweeping. Spills should be cleaned when they occur and dirt rinsed off with water. Heavily soiled areas may be wet-cleaned by mopping or by scrubbing with a rotary floor machine equipped with a scrubbing brush and a suitable, high quality commercial detergent. Interior floors that require polishing should be maintained using a compatible, premium-grade, emulsion-type, commercial floor polish, following manufacturer's instructions and safety requirements.

END OF SECTION 03366





**DIVISION 5**

**METALS**

05120

Structural Steel

05120-1 to 2

05500

Metal Fabrications & Misc. Metal Work

05500-1 to 2



## SECTION 05120

## STRUCTURAL STEEL

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Structural steel framing members, base plates, plates and grouting under base plates.

## 1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS

- A. Section 03001: Placement of anchors for casting into concrete.

## 1.3 SUBMITTALS: Comply with Section 01300.

- A. Shop Drawings: Indicate sizes, spacing, and locations of structural members, openings, connections, cambers, loads, and welded connections.

## 1.4 QUALITY ASSURANCE: Comply with the provisions of the following codes and standards:

- A. AISC "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings".
- B. AISC Specifications for Structural Joints using ASTM A325 or A490 Bolts approved by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation"
- C. AWS D1.1 "Structural Welding Code".
- D. All welding electrodes shall be A233 class E-70 series. Unless indicated otherwise: All welds on structural members shall be minimum 3/16" fillet welds and all welds for moment connections shall be minimum 1/4" fillet welds continuous all around.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site at such intervals to ensure uninterrupted progress of the work.
- B. Deliver anchor bolts and anchorage devices, which are to be imbedded in cast-in-place concrete or masonry in ample time not to delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground, using pallets, platforms or other supports. Protect steel members and packaged materials from erosion and deterioration.

## PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Structural Steel Members: ASTM A992, Fy=50 ksi.
- B. Structural Tubing:
  - 1. Cold formed: ASTM A500, Grade B, Fy=46ksi.
  - 2. Hot formed: ASTM A501, Fy=36ksi.
- C. Pipe: Hot formed; ASTM A501, Fy=36ksi.
- D. Bolts, Nuts, and Washers: ASTM A325, galvanized to ASTM A153 for galvanized members.
- E. Anchor Bolts: ASTM A307.
- F. Welding Materials: AWS D1.1; type required for materials being welded.
- G. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days; manufactured by "Master Builders - Masterflow 713", "Euclid - euco N.S.", "L & M - Crystex, or "U. S. Grout - Five Star Grout".
- H. Shop and Touch-Up Primer: SSPC 15, Type 1, red oxide.

## PART 3 EXECUTION

## 3.1 EXAMINATION AND PREPARATION

- A. Verify that field conditions are acceptable and are ready to receive work.

## 3.2 FABRICATION AND ERECTION: Fabricate and assemble structural assemblies in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members as indicated.

- A. Allow for erection loads. Provide temporary bracing to maintain framing in alignment until completion of erection and installation of permanent bridging and bracing.
- B. Field weld components indicated on Drawings or shop drawings.
- C. Do not field cut or alter structural members without approval of Architect/Engineer.
- D. Fabricate work to shape and size with sharp lines and angles and smooth surfaces. Securely weld or bolt with bearing type connections, unless otherwise indicated. Dress welds smooth on exposed surfaces. Provide rabbets, lugs and brackets so that work can be assembled in a neat and substantial manner. Smooth exposed ends and edges of metal and form joints exposed to weather to exclude water.
- E. Erect all work true to dimensions, line, level and plumb.
- F. Weld in compliance with AWS Code for procedures, appearance and quality of welds, and methods used in correcting work.
- G. See that anchor bolts in concrete are properly set to template.
- H. Punch structural steel and/or furnish all clips required to accommodate work of other trades, where supported on or secured to structural steel.
- I. Grout bearing plates on concrete to exact level required with grout and support on steel wedges until grout has set hard.

## 3.3 SHOP PAINTING: Shop paint all structural steel work, except those members or portions thereof to be embedded in concrete or mortar. Paint embedded steel which is partially exposed on the exposed portions and the initial 2" of embedded areas only. Do not paint surfaces which are to be welded.

- A. Surface Preparation: Before painting, thoroughly clean all surfaces of all grease, rust, welding droppings and loose mill scale by methods conforming to SSPC-SP-1 SSPC-SP-3. After erection, wire brush and touch-up welded or abraided areas with primer.
- B. Painting: Immediately after surface preparation, apply structural steel primer paint in accordance with manufacturer's instructions and at a rate to provide a uniform dry film thickness of 2.0 mils. Use painting methods which will result in full coverage of joints, corners, edges and all exposed surfaces.

## 3.4 TOUCH-UP PAINTING: Cleaning and touch-up painting of field welds, bolted connections and abraided areas of the shop paint on structural steel is included in Section 09900.

END OF SECTION

## SECTION 05500

## METAL FABRICATIONS AND MISCELLANEOUS METAL WORK

## PART 1 GENERAL

- 1.1 SCOPE: Provide metal fabrications and miscellaneous metal work, complete, including:
- A. Railings.
  - B. Metal supports for work of other trades.
  - C. Furnish miscellaneous metal or steel attachments, anchors, plates, angles, etc.
  - D. Include anchors, angles, bolts, expansion shields for items in this section only, and other accessories shown in details and/or required for complete installation of all work.
- 1.2 SUBMITTALS: Comply with Section 01300. Submit shop drawings for the fabrication and erection of all assemblies of miscellaneous metal work. Include plans, elevations and details of sections and connections. Show anchorage and accessory items.

## PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Miscellaneous Steel Bars, Rods and Shapes: ASTM A36, A283, A108, A663, A501 and A575 as applicable.
- B. Steel Pipe: ASTM A53 black finish steel pipe, standard weight (Schedule 40).
- C. Bolts and Nuts: ASTM A307, Grade A. High strength bolts; ASTM A325. Hot-dip galvanize all items in accordance with ASTM A153.
- D. Expansion Bolts Wedge Anchors: Ramset "Trubolt" or Hilti "Kwik Bolt".
- E. Expansion Shields: F.S. FF-S-325.
- F. Anchor Bolts: Furnish and deliver to site, anchor bolts and other items to be embedded in concrete. Provide necessary shop details and diagrams for concrete forms and, if required, provide templates to ensure proper and accurate locations and setting of anchor bolts.
- G. Toggle Bolts: Tumble-wing type F.S. FF-B-588 type, class and style as required.
- H. Lock Washers: F.S. FF-W-84, helical spring type carbon steel.
- I. Miscellaneous Items: Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous metal shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or other structures.
- J. Shop Paint: Lead free, alkyd primer; Tnemec 10-99, Southern Coatings Enviro-Guard 1-2900, or approved equal, meeting performance requirements of F.S. TT-P-86, and passing ASTM B 117 after 500 hours. Primer selected must be compatible with finish paint requirements specified in Section 09900.
- K. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel work, complying with SSPC- Paint 20.

## 2.2 FABRICATION

- A. Workmanship: Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
- B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use. Cut reinforce, drill and tap miscellaneous metal work as indicated to receive finish hardware and similar items.
- E. Shop Painting:
  - 1. Shop paint miscellaneous metal work, except concealed metal work, members or portion of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
  - 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 or SSPC-3.
  - 3. Remove oil grease and similar contaminants in accordance with SSPC SP-13.
  - 4. Immediately after surface preparation, brush or spray a primer in accordance with manufacturer's instructions, and at rate to provide uniform dry film thickness of 2.0 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges, and exposed surfaces.

### 2.3 MISCELLANEOUS METAL FABRICATIONS

- A. Pipe Railings: Steel or aluminum pipe as indicated on drawings, with fittings and brackets as variously detailed, of sizes indicated, neatly welded and all welds dressed smooth. Prime as specified in this section.
- B. Metal Supports: Provide structural steel lintels, channels, braces, angles, etc., as indicated and assemble as detailed. Secure all connections to provide rigid supports for all items required including supports not specifically specified in other sections.

## PART 3 EXECUTION

- 3.1 PREPARATION: Furnish setting drawings, diagrams, templates, instructions and directions for installation of anchorages. Coordinate delivery of such items to site.
- 3.2 INSTALLATION
  - A. Perform cutting, drilling and fitting required for installation; set work accurately in location, alignment and elevation, plumb, level and measured from established lines and levels. Provide anchorage devices and fasteners where necessary for installation to other work.
  - B. Use care in handling and erection so as not to mar, abrade or stain finished surfaces. Where aluminum is to be placed in contact with steel, concrete or other dissimilar materials, back paint the aluminum before erection with acceptable bituminous paint.
  - C. After erection, adequately protect exposed parts of work from damage. After completion of other work in the vicinity, thoroughly clean finished surfaces.
- 3.3 TOUCH-UP SHOP PAINTING: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting. Use galvanizing repair paint on damaged galvanized surfaces.

END OF SECTION

<b>DIVISION 6</b>	<b>WOOD AND PLASTIC</b>	
06100	Rough Carpentry	
06160	Sheathing	
06402	Interior Architectural Woodwork	

06100-1 to 3
06160-1 to 3
06402-1 to 3





## SECTION 06100

## ROUGH CARPENTRY

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Framing with dimension lumber.
  - 2. Framing with engineered wood products.
  - 3. Wood blocking and nailers.
  - 4. Wood furring.
  - 5. Wood sleepers.
  - 6. Plywood backing panels.

## 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.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
  - 1. Wood-preservative-treated wood.
  - 2. Engineered wood products.
  - 3. Power-driven fasteners.
  - 4. Powder-actuated fasteners.
  - 5. Expansion anchors.
  - 6. Metal framing anchors.

## PART 2 - PRODUCTS

## 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
  - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
  - 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.

- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
  - D. Application: Treat items indicated on Drawings, and the following:
    1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
    2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
    3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
    4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawlspaces or unexcavated areas.
    5. Wood floor plates that are installed over concrete slabs-on-grade.
- 2.3 DIMENSION LUMBER FRAMING
- A. Maximum Moisture Content: 19 percent
  - B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
  - C. Framing Other Than Non-Load-Bearing Interior Partitions: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.
    1. Or as indicated on Structural Drawings
- 2.4 ENGINEERED WOOD PRODUCTS
- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.
    1. Extreme Fiber Stress in Bending, Edgewise: As indicated on Structural Drawings. If not indicated on drawings then contact Owners Representative for direction..
    2. Modulus of Elasticity, Edgewise: As indicated on Structural Drawings. If not indicated on drawings then contact Owners Representative for direction.
  - B. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
    1. Provide I-joists manufactured without urea formaldehyde.
    2. Web Material: Plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1.
    3. Structural Properties: Provide units with depths and design values not less than those indicated on Structural Drawings. If not indicated on drawings then contact Owners Representative for direction
    4. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.
  - C. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
    1. Material: Provide rim boards made without urea formaldehyde.
    2. Thickness: As indicated on Structural Drawings. If not indicated on drawings then contact Owners Representative for direction..
    3. Provide performance-rated product complying with APA PRR-401, rim board grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.
- 2.5 MISCELLANEOUS LUMBER
- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
    1. Blocking.
    2. Nailers.
    3. Furring.
    4. Grounds.
  - B. 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 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
  2. Eastern softwoods, No. 2 Common grade; NeLMA.
  3. Northern species, No. 2 Common grade; NLGA.
  4. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- 2.6 PLYWOOD BACKING PANELS
- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.
- 2.7 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 (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- 2.8 METAL FRAMING ANCHORS
- A. Basis-of-Design Products: Subject to compliance with requirements, provide products indicated on Drawings or comparable products by one of the following:
    1. Simpson Strong-Tie Co., Inc.
  - 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 (Z180) coating designation.
- 2.9 MISCELLANEOUS MATERIALS
- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); 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 furring, nailers, blocking, grounds, 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. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
  - D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
  - E. Do not splice structural members between supports, unless otherwise indicated.
  - F. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
    1. NES NER-272 for power-driven fasteners.
    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 06100



## SECTION 06160

## SHEATHING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Wall sheathing.
  - 2. Roof sheathing.
  - 3. Subflooring.
  - 4. Underlayment.
  - 5. Building paper.
  - 6. Building wrap.
  - 7. Sheathing joint-and-penetration treatment.
  - 8. Flexible flashing at openings in sheathing.

## 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-preserved treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements.
- B. Research/Evaluation Reports: For the following:
  - 1. Preservative-treated plywood.
  - 2. Building wrap.

## 1.3 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 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
- B. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
  - 1. Type and Thickness: Regular, 1/2 inch (13 mm)

## 2.3 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I sheathing.

## 2.4 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, [Exterior, Structural I, C-C Plugged] [Exterior, C-C Plugged] [Exposure 1, Structural I, Underlayment] [Exposure 1, Underlayment] single-floor panels.
- B. Plywood Subflooring: Exposure 1, Structural I single-floor panels or sheathing.
- C. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exposure 1 Underlayment with fully sanded face.
- D. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than 5/8-inch (15.9-mm) nominal thickness, for ceramic tile set in organic adhesive.
- E. Plywood Underlayment for Carpet: DOC PS 1, Interior, Underlayment.

## 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 Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

## 2.7 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric silicone joint sealant recommended by sheathing manufacturer.

## 2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use indicated by manufacturers of both adhesives and panels.
  - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. 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 (0.6 mm).

## 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."
- 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. Combination Subfloor-Underlayment:
    - a. Glue and nail to wood framing.
    - b. Screw to cold-formed metal framing.
  - 2. Subflooring:
    - a. Glue and nail to wood framing.
    - b. Screw to cold-formed metal framing.
  - 3. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Screw to cold-formed metal framing.
  - 4. Underlayment:
    - a. Nail to subflooring.

### 3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to wood framing with nails or screws.
  - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 3. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.
  - 4. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials.

### 3.4 WEATHER-RESISTANT SHEATHING-PAPER INSTALLATION

- A. General: Cover sheathing with weather-resistant sheathing paper as follows:
  - 1. Cut back barrier 1/2 inch (13 mm) 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 (100-mm) overlap, unless otherwise indicated.
- B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails

### 3.5 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 (100 mm), 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 06160





## SECTION 06402

## INTERIOR ARCHITECTURAL WOODWORK

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Stairwork and rails.
  - 2. Wood cabinets.
  - 3. Plastic-laminate cabinets.
  - 4. Plastic-laminate countertops.
  - 5. Solid-surfacing-material countertops.
  - 6. Shop finishing of woodwork.
- B. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips unless concealed within other construction before woodwork installation.
- C. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 06 Section "Rough Carpentry."

## 1.2 SUBMITTALS

- A. Product Data: For Solid-surfacing material, cabinet hardware and accessories, handrail brackets 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: Work in this Section shall be in conformity with the Architectural Woodwork Standards.

## 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of woodwork.
- B. Quality Standard: Unless otherwise indicated, work shall be in accordance with the Grade or Grades specified of the Architectural Woodwork Standards

## 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 MATERIALS

- A. Wood Species for Opaque Finish: Eastern white pine, sugar pine, or western white pine
- B. Wood Products:
  - 1. Softwood Plywood: DOC PS made with adhesive containing no urea formaldehyde.
- C. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

## 2.2 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 (70-mm), 5-knuckle steel hinges made from 0.095-inch- (2.4-mm-) 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. Back-Mounted Pulls: BHMA A156.9, B02011.
- D. Wire Pulls: Back mounted, solid metal 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.
- E. Catches: Magnetic catches, BHMA A156.9, B03141
- F. Drawer Slides: BHMA A156.9, B05091.
  - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; [full-extension] [full-overtravel-extension] type; zinc-plated steel ball-bearing slides.
- G. Door Locks: BHMA A156.11, E07121.
- H. Drawer Locks: BHMA A156.11, E07041.
- I. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.

## 2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Rough Carriages for Stairs: Select Structural No. 1 No. 2 grade Douglas fir-larch, hem-fir, or southern pine; kiln dried to 15 percent maximum moisture content:
- C. Handrail Brackets: Extruded from aluminum with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Sized to provide 1-1/2-inch (38-mm) clearance between handrail and wall.
- D. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

## 2.4 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. Stairwork and Rails.
  - 1. Treads: Opaque finish.
  - 2. Risers: Opaque finish.
  - 3. Stringers: Opaque finish.
  - 4. Handrails: Opaque finish.
- C. Wood Cabinets for Opaque Finish:
  - 1. Architectural Woodwork Standards Construction Type: Style B, Face Frame.
  - 2. Architectural Woodwork Standards Construction Type: Type I, multiple self-supporting units rigidly joined together.
  - 3. Architectural Woodwork Standards Door and Drawer Front Style: Flush overlay.
- D. Plastic-Laminate Countertops:
  - 1. High-Pressure Decorative Laminate Grade: HGS.
  - 2. Colors, Patterns, and Finishes: As selected by Owners Representative from laminate manufacturer's full range of solid colors, gloss finish.
  - 3. Edge Treatment: Same as laminate cladding on horizontal surfaces
  - 4. Core Material at Sinks: plywood.

## 2.5 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. Opaque Finish:
  - 1. Grade: Premium
  - 2. Color: As selected from manufacturer's full range.
  - 3. Sheen: 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 (3 mm in 2400 mm). 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 or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Stairs: Securely anchor carriages to supporting substrates. Install stairs with treads and risers no more than 1/8 inch (3 mm) from indicated position.
- G. Railings: Install rails with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) variation from a straight line.
  - 1. Wall Rails: Support rails on indicated metal brackets securely fastened to wall framing.
- 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 as indicated or if not indicated, through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) 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 06402



**DIVISION 7      THERMAL AND MOISTURE PROTECTION**

07111	Bituminous Dampproofing	07111-1 to 2
07210	Thermal Insulation	07210-1 to 3
07211	Metal Building Insulation System	07211-1 to 2
07241	Polymer-Based Exterior Insulation and Finish System	07241-1 to 8
07620	Sheet Metal Flashing and Trim	07620-1 to 5
07920	Joint Sealants	07920-1 to 4



## SECTION 07111

## BITUMINOUS DAMPPROOFING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Cold-applied, emulsified-asphalt dampproofing.

## 1.2 SUBMITTALS

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

## 1.3 PROJECT CONDITIONS

- A. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

## PART 2 - PRODUCTS

## 2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. ChemMasters Corp.
  - 2. Degussa Building Systems; Sonneborn Brand Products.
  - 3. Gardner Gibson, Inc.
  - 4. Henry Company.
  - 5. Karnak Corporation.
  - 6. Koppers Inc.
  - 7. Malarkey Roofing Products.
  - 8. Meadows, W. R., Inc.
  - 9. Tamms Industries, Inc.
  - 10. Approved Equal
- B. Trowel Coats: ASTM D 1227, Type II, Class 1.

## 2.2 PROTECTION COURSE

- A. Protection Course, Asphalt-Board Type: ASTM D 6506, premolded, 1/8-inch- (3-mm-) thick, multi-ply, semirigid board consisting of a mineral-stabilized asphalt core sandwiched between layers of asphalt-saturated felt, and faced on 1 side with polyethylene film.

## 2.3 MISCELLANEOUS MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.
- B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

## PART 3 - EXECUTION

## 3.1 PREPARATION

- A. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

## 3.2 APPLICATION, GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
- B. Apply dampproofing to footings and foundation walls where opposite side of wall faces building interior and occupied space.

1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches (150 mm) over outside face of footing.
  2. Extend 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
  3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Apply dampproofing to provide continuous plane of protection on interior face of above-grade, exterior [concrete] [and] [masonry] [single-wythe masonry] walls unless walls are indicated to receive direct application of paint.
- 3.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING
- A. On Concrete Foundations: 1 trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).
- 3.4 INSTALLATION OF PROTECTION COURSE
- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing material manufacturer's written recommendations for attaching protection course.
1. Install protection course on same day of installation of dampproofing (while coating is tacky) to ensure adhesion.

END OF SECTION 07111



## SECTION 07210

## THERMAL INSULATION

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Perimeter insulation under slabs-on-grade.
  - 2. Perimeter wall insulation (supporting backfill).
  - 3. Concealed building insulation.
  - 4. Sound attenuation insulation.

## 1.2 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
  - 1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm (13-m/s) air velocity.
  - 2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

## 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product test reports.
- D. Research/Evaluation Reports: For foam-plastic insulation.

## 1.4 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.
- B. Recycled Content: Provide glass-fiber insulation with recycled content so postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 20 percent by weight.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

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

## 2.2 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type VI, 1.80 lb/cu. ft. (29 kg/cu. m), with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:

1. Available Manufacturers:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company.
    - c. Owens Corning.
    - d. Pactiv Building Products Division.
    - e. Approved Equal
  - B. Molded-Polystyrene Board Insulation: ASTM C 578, Type VIII, 1.15 lb/cu. ft. (18 kg/cu. m) , with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.
    1. Available Manufacturers:
      - a. DiversiFoam Products.
      - b. Manufacturers with a third-party certification program satisfying model building code mandatory requirements for foam plastics.
      - c. Approved Equal
- 2.3 GLASS-FIBER BLANKET INSULATION
- A. Available Manufacturers:
    1. CertainTeed Corporation.
    2. Guardian Fiberglass, Inc.
    3. Johns Manville.
    4. Knauf Fiber Glass.
    5. Owens Corning.
    6. Approved Equal
  - B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
  - C. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, vapor-retarder membrane on 1 face.
  - D. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
    1. 3-1/2 inches (89 mm) thick with a thermal resistance of 13 deg F x h x sq. ft./Btu at 75 deg F (2.3 K x sq. m/W at 24 deg C)].
    2. 5-1/2 inches (140 mm) thick with a thermal resistance of 19 deg F x h x sq. ft./Btu at 75 deg F (3.3 K x sq. m/W at 24 deg C).

### PART 3 - EXECUTION

- 3.1 INSTALLATION, GENERAL
  - A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
  - B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
  - C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
  - D. 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.
  - E. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
- 3.2 INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION
  - A. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
    1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.
  - B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

### 3.3 *INSTALLATION OF GENERAL BUILDING INSULATION*

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Seal joints between foam-plastic 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 as recommended by insulation manufacturer.
- C. Set vapor-retarder-faced units with vapor retarder to warm-in-winter side of construction, unless otherwise indicated.
  - 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
  - 2. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures.
  - 3. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
  - 4. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- D. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
  - 1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
  - 2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
  - 3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
  - 4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
- E. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

### 3.4 *INSTALLATION OF INSULATION IN CEILINGS FOR SOUND ATTENUATION*

- A. Install 3-inch- (76-mm-) thick, unfaced glass-fiber blanket insulation over suspended ceilings so that insulation extends over entire ceiling.

### 3.5 *INSTALLATION OF VAPOR RETARDERS*

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- C. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

END OF SECTION 07210



## SECTION 07211

## METAL BUILDING INSULATION SYSTEM

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Roof - Energy Saver FP System (or approved equal if required – See drawings)
- B. Walls - Metal building insulation.

## 1.2 ENVIRONMENTAL REQUIREMENTS

- A. Install insulation adhesives in accordance with manufacturer's instructions.

## 1.3 LOCATION REQUIREMENTS

- A. Provide an approved system to the entire roof of building.
- B. Provide wall insulation as specified.

## PART 2 PRODUCTS

## 2.1 ENERGY SAVER SYSTEM MATERIALS

- A. Steel strap: 50 KSI tempered, high tensile strength steel, galvanized, primed and painted of fabric.
  - 1. Minimum size shall be .022" thick x 1" wide x continuous width.
- B. Fasteners: 12-14 TY3 3/4" self-drilling fasteners with 3/4" OD washers for up to 1/4" thick, light gauge steel. For heavier gauge steel, up to 3/8", use 12-24 TY5 1 1/4" self drilling fasteners with a banding clip. All fasteners shall be colored to match fabric color. Banding clips are to be installed per manufacturer's instructions.
- C. Sealants: Shall be fast-tack solvent-based synthetic rubber adhesive for sealing fabric laps and edges. Two sided tape approved by manufacturer may be substituted for synthetic rubber adhesive.
- D. Insulation: Minimum R-value to be at or above an actual R-38 and shall be a combination of unfaced in the purlin cavity and faced over the purlins (between purlins and the roof sheets).
  - 1. Roof insulation to be either both of the below items or only item 2.1.D.3. See Drawings.
  - 2. Purlin cavity insulation shall be fiberglass blanket insulation meeting ASTM C 991, Type 1 (unfaced) and ASTM E136, or other insulation form as may be recommended and submitted by manufacturer and approved by the Construction Manager during submittals. Fiberglass blanket shall be rated FHC 25/50 with a flame spread rating of 25 or less and a smoke developed rating of 50 or less, tested in accordance with ASTM E 84.
    - a. Minimum R-value for Energy Saver System between purlins to be R-25.
  - 3. Over the purlin insulation shall be flexible fiber glass metal building insulation as manufactured in accordance with ASTM C 991, Type II (Faced), "Standard Specification for Flexible Insulation for Pre-Engineered Metal Buildings", having an R value of 13 roof. See 2.3.B for facing material.
    - a. Minimum R-value for roofs to be R-13.
- E. Fabric: Woven reinforced high-density polyethylene yarns coated on both sides with a continuous white or colored polyethylene film. This material is manufactured in large custom fit pieces by hot air welding from roll goods. Pieces are to be fabricated to substantially fit the large defined building areas with minimum practical sealing to be done on job site. Fabric to be folded or rolled to allow for rapid pullout on the strap support system.
  - 1. Coating thickness: 1.5 WFR WHT/1.25 WFR LT GRY (+/- 10%)
  - 2. Weight: 4.65 oz/sq. yd. (+/- 10%, ASTM D-1910)
  - 3. Tensile Strength: 175 lbs. warp x 156 lbs weft (ASTM-d751, Grab)
  - 4. Elongation: 31% warp x 26% fill.
  - 5. Tear Strength: 56 lbs warp x 51 lbs weft (ASTM D-751, Tounge)
  - 6. Moisture Vapor Transmission: .015 (ASTM E-96, Method A)

7. Thickness 7.5 Mills (+/- 10%)
8. Mullen Burst: 270 psi (ASTM D-751)
9. Puncture Resistance: 81 lbs (ASTM D-4833)
10. Flame Resistance: Flame Spread – 5/smoke developed-20 (ASTM E-84) NFPA 701-Pass
11. Sound Absorption: NRC Rating 0.70 (ASTM C-423-02a)
12. UV Weathering: UV stabilizers added for extra protection.
13. Cold Temperature Flexibility: -55 degrees Fahrenheit (ASTM D-2136)

## 2.2 MISCELLANEOUS MATERIALS:

- A. Provide adhesive for bonding insulation, mechanical anchors or other required items as recommended by the insulation manufacturer.

## 2.3 BUILDING WALLS MATERIALS

- A. Insulation: Minimum R-value to be at or above an actual R-38 and shall be a combination of unfaced in the girt cavity and faced over the girts (between girts and the wall sheets).
  1. Wall insulation to be either both of the below items or only item 2.3.A.3. See Drawings.
  2. Girt cavity insulation shall be fiberglass blanket insulation meeting ASTM C 991, Type 1 (unfaced) and ASTM E136, or other insulation form as may be recommended and submitted by manufacturer and approved by the Construction Manager during submittals. Fiberglass blanket shall be rated FHC 25/50 with a flame spread rating of 25 or less and a smoke developed rating of 50 or less, tested in accordance with ASTM E 84.
    - a. Minimum R-value for Energy Saver System between girts to be R-25.
  3. Over the girt insulation shall be flexible fiber glass metal building insulation as manufactured in accordance with ASTM C 991, Type II (Faced), "Standard Specification for Flexible Insulation for Pre-Engineered Metal Buildings", having an R value of 13 roof. See 2.3.B for facing material.
    - a. Minimum R-value for walls to be R-13.
- B. The insulation shall be faced with "Standard Duty Polypropylene Scrim Kraft" (Lamtec WMP-10, or Compac MB2001), or equal. The permeance rating shall not exceed .02 when tested in accordance with ASTM E 96 (Dessicant Method), "Standard Test Methods for Water Vapor Transmission of Materials".
- C. The composite product shall have a fire hazard classification of 25 (maximum) flame spread index, and 50 (maximum) smoke developed index (FHC 25/50) when tested in accordance with ASTM E 84 or UL 723.

## PART 3 EXECUTION

- 3.1 INSTALLATION: Comply with manufacturer's instructions. Extend insulation full thickness over entire surface to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.

END OF SECTION 07211

## SECTION 07241

## EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Exterior insulation and finish system (EIFS)
- B. Related Sections:
  - 1. Division 06 Section "Sheathing" for sheathing[ and weather-resistant sheathing paper].
  - 2. Division 07 Section "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants.

## 1.3 SYSTEM DESCRIPTION

- A. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

## 1.4 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with the following:
  - 1. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
  - 2. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.
- B. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:
  - 1. Abrasion Resistance: Sample consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board; cured for a minimum of 28 days; and showing no cracking, checking, or loss of film integrity after exposure to 528 quarts (500 L) of sand when tested per ASTM D 968, Method A.
  - 2. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
  - 3. Accelerated Weathering: Five samples per ICC-ES AC219 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G 153 or ASTM G 154.
  - 4. Freeze-Thaw: No surface changes, cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination, or indications of delamination between components when viewed under 5 times magnification after 60 cycles per EIMA 101.01 and 10 cycles per ICC-ES AC219.
  - 5. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch (50.8-by-50.8-mm) clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D 3273 and evaluated according to ASTM D 3274.
  - 6. Salt-Spray Resistance: No deleterious effects when tested according to ICC-ES AC219.
  - 7. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per EIMA 101.03 and ICC-ES AC219.
  - 8. Water Penetration: Sample consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded-polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. (299 Pa) of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.

9. Water Resistance: Three samples, each consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
10. Wind-Driven-Rain Resistance: Resist wind-driven rain according to ICC-ES AC219.
11. Impact Resistance: Sample consisting of 1-inch- (25.4-mm-) thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following:
  - a. Standard Impact Resistance: 25 to 49 inch-lb (2.8 to 5.6 J).
  - b. High Impact Resistance: 90 to 150 inch-lb (10.2 to 17 J).
12. Structural Performance Testing: EIFS assembly and components shall comply with ICC-ES AC219 when tested per ASTM E 330.

#### 1.5 SUBMITTALS

- A. Product Data: For each type and component of EIFS indicated.
- B. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- C. Samples for Initial Selection: For each type of finish-coat color and texture indicated.
  1. Include similar Samples of joint sealants and exposed accessories involving color selection.
- D. Samples for Verification: 24-inch- (600-mm-) square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including custom trim, each profile, [an aesthetic reveal, a typical control joint filled with sealant of color selected.
  1. Include sealants and exposed accessory Samples to verify color selected.
- E. Qualification Data: For Installer, fabricator/erector, and testing agency.
- F. Manufacturer Certificates: Signed by manufacturers certifying that EIFS, the substrate and joint sealants comply with requirements.
- G. Material or Product Certificates: For cementitious materials and aggregates and for each insulation and joint sealant, from manufacturer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each water-/weather-resistive barrier, Insulation, reinforcing mesh, joint sealant, and coating.
- I. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
  1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- J. Field quality-control reports and special inspection reports.
- K. Evaluation Reports: For fasteners adhesive membrane flashing and EIFS (including insulation).
- L. Maintenance Data: For EIFS to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
- C. Mockups: Build mockups 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.
  1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
  1. Stack insulation board flat and off the ground.



## 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

## 1.9 COORDINATION

- A. Coordinate installation of EIFS with related Work specified in other Sections to ensure that wall assemblies, including sheathing, weather-resistant sheathing paper, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes. Do not allow water to penetrate behind flashing and barrier coating of EIFS.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following]
  1. Dryvit Systems, Inc.
  2. Sto Corp.

### 2.2 MATERIALS

- A. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and 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. Primer/Sealer: EIFS manufacturer's standard substrate conditioner] designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
- C. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
- D. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate and complying with one of the following:
  1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
  2. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
  3. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
- E. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
  1. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
  2. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
  3. Dimensions: Provide insulation boards not more than 24 by 48 inches (610 by 1219 mm) and in thickness indicated, but not more than 4 inches (102 mm) thick or less than thickness allowed by ASTM C 1397.
  4. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
- F. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) per ASTM E 2098 and EIMA 105.01; complying with ASTM D 578 and the following:
  1. Standard-Impact Reinforcing Mesh: Not less than 4.0 oz./sq. yd. (136 g/sq. m).
  2. High-Impact Reinforcing Mesh: Not less than 15 oz./sq. yd. (509 g/sq. m)
  3. Strip Reinforcing Mesh: Not less than 3.75 oz./sq. yd. (127 g/sq. m)>.

4. Detail Reinforcing Mesh: Not less than 4.0 oz./sq. yd. (136 g/sq. m)>.
  5. Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd. (244 g/sq. m).
- G. Base-Coat Materials: EIFS manufacturer's standard mixture complying with[ one of] the following:
1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
  3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
  4. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- H. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation complying with one of the following:
1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
- I. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
- J. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating complying with the following:
1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
    - a. Aggregate: Marble chips of size and color as selected by Owners Representative from manufacturer's full range
  2. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
  3. Colors: As selected by Owners Representative from manufacturer's full range.
- K. Water: Potable.
- L. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
1. For attachment, provide manufacturer's standard fasteners suitable for substrate.
- M. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
1. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
  2. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
  3. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
  4. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
  5. Parapet Cap Flashing: Type for both flashing and covering parapet top with design complying with ASTM C 1397.
- 2.3 ELASTOMERIC SEALANTS
- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
- B. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants."
- C. Sealant Color: As selected by Owners Representative from manufacturer's full range.

## 2.4 MIXING

- A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Begin coating application only after surfaces are dry.
  - 2. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

### 3.3 EIFS INSTALLATION, GENERAL

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

### 3.4 SUBSTRATE PROTECTION APPLICATION

- A. Primer/Sealer: Apply over substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
- B. Waterproof Adhesive/Base Coat: Apply over sloped surfaces, window sills and parapets to protect substrates from degradation.
- C. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

### 3.5 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
  - 1. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
  - 2. Window Sill Flashing: Use at windows unless otherwise indicated.
  - 3. Expansion Joint: Install at locations indicated and where required by EIFS manufacturer.
  - 4. Casing Bead: Use at other locations.
  - 5. Parapet Cap Flashing: Use where indicated on Drawings.

### 3.6 INSULATION INSTALLATION

- A. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:
  - 1. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than 1/4 inch (6.4 mm) for factory mixed and not less than 3/8 inch (9.6 mm) for field mixed, measured from surface of insulation before placement.

2. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
  3. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
  4. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
    - a. Steel Framing: 5/16 inch (8 mm).
    - b. Wood Framing: 1 inch (25 mm).
    - c. Concrete and Masonry: 1 inch (25 mm).
  5. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
  6. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
  7. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than 12 inches (300 mm) wide or 6 inches (150 mm) high. Offset joints not less than 6 inches (150 mm) from corners of window and door openings and not less than 4 inches (100 mm) from aesthetic reveals.
    - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches (150 mm) from horizontal and 4 inches (100 mm) from vertical joints in sheathing.
    - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
  8. Interlock ends at internal and external corners.
  9. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch (1.6 mm) occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
  10. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
  11. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch (0.8 mm) from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch (1.6 mm).
  12. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than 3/4 inch (19 mm).
  13. Install foam shapes and attach to sheathing.
  14. Interrupt insulation for expansion joints where indicated.
  15. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
  16. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
  17. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches (64 mm) over front and back face unless otherwise indicated on Drawings.
  18. Treat exposed edges of insulation as follows:
    - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
    - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
    - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
  19. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS protective-coating lamina.
- B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
1. At expansion joints in substrates behind EIFS.
  2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.

3. At floor lines in multilevel wood-framed construction.
4. Where wall height or building shape changes.
5. Where EIFS manufacturer requires joints in long continuous elevations.

### 3.7 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch (1.6-mm) dry-coat thickness.
- B. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (204 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
  1. Standard-impact reinforcing mesh everywhere unless otherwise indicated
  2. High-impact reinforcing mesh: Bottom 4' -0" of wall.
- C. Double-Layer Reinforcing Mesh Application: Where indicated, apply second base coat and second layer of standard-impact reinforcing mesh, overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.
- D. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending 4 inches (100 mm) beyond perimeter. Apply additional 9-by-12-inch (230-by-300-mm) strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- (200-mm-) wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches (100 mm) on each side of corners.
  1. At aesthetic reveals, apply strip reinforcing mesh not less than 8 inches (200 mm) wide.
  2. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- E. Foam Shapes: Fully embed reinforcing mesh in base coat.
- F. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

### 3.8 FINISH-COAT INSTALLATION

- A. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
- B. Finish Coat: Apply over dry primed base coat, 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 Owners Representative from manufacturer's full range.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

### 3.9 INSTALLATION OF JOINT SEALANTS

- A. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
  1. Apply joint sealants after base coat has cured but before applying finish coat.
  2. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
  3. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
  4. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
  5. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
  6. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

### 3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  1. According to ICC-ES AC24 and ICC-ES AC219.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. EIFS Tests and Inspections: For the following:
  1. According to ICC-ES AC24 and ICC-ES AC219.

- D. Remove and replace EIFS where test results indicate that EIFS do not comply with specified requirements.
- E. Prepare test and inspection reports.

3.11 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07241

## SECTION 07620

## SHEET METAL FLASHING AND TRIM

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Formed roof drainage sheet metal fabrications.
  - 2. Formed low-slope roof 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.
- B. Preinstallation Conference: Conduct conference at Project site.

## 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 10 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. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.
  - 2. Surface: Mill phosphatized for field painting
  - 3. 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.
  - 4. Color: As selected by Owners Representative from manufacturer's full range

## 2.2 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) 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 (116 deg C).

2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
- C. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

### 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
    - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
  2. Fasteners for 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 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.
- 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 (13 mm) wide and 1/8 inch (3 mm) thick.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

### 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
1. 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 (25 mm) 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.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

### 2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Base Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch (0.71 mm) thick.
- B. Counterflashing and Flashing Receivers: Fabricate from the following materials:
1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
  2. Aluminum-Zinc Alloy-Coated Steel: [0.022 inch (0.56 mm)] <Insert thickness> thick.
- C. Roof-Penetration Flashing: Fabricate from the following materials:
1. Galvanized Steel: 0.028 inch (0.71 mm) thick.



## 2.6 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- B. Valley Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 inch (0.71 mm)thick.
- C. Drip Edges: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm)thick.
- D. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

## 2.7 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams where flashing is discontinuous. Fabricate from the following materials:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 5 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials, unless noted otherwise in the drawings:
  - 1. Galvanized Steel: 0.022 inch (0.56 mm) thick.
- C. Wall Expansion-Joint Cover: Fabricate from the following materials:
  - 1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

## PART 3 - EXECUTION

### 3.1 UNDERLAYMENT INSTALLATION

- A. 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 (50 mm).
- B. 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 (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). 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.
  - 3. Space cleats not more than 12 inches (300 mm) 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 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 (3 m) with no joints allowed within 24 inches (600 mm) 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 (25 mm) 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 (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws. For metal decking; not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
  - E. Seal joints as shown and as required for watertight construction.
  - 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 (38 mm), except reduce pre-tinning where pre-tinned surface would show in completed Work.
    1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
  - G. Rivets: Rivet joints in 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 (900 mm) 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 (15.24 m) apart. Install expansion-joint caps.
    2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.
  - C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
- 3.4 ROOF FLASHING INSTALLATION
- A. General: Install sheet metal flashing and trim to comply with 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 (75-mm) centers.
  - C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
  - 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 (100 mm) 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 (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.
  - 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, jamb, and similar flashings to extend 4 inches (100 mm) 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 07620



## SECTION 07920

## JOINT SEALANTS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Latex joint sealants.
  - 4. Preformed joint sealants.
  - 5. Acoustical joint sealants.

## 1.2 SUBMITTALS

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

## 1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- B. Preinstallation Conference: Conduct conference at Project site.

## 1.4 WARRANTY

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

- A. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

## 2.2 SILICONE JOINT SEALANTS

- A. Mildew-Resistant Silicone Joint Sealant : ASTM C 920.
  - 1. Type: Single component (S) or multicomponent (M).
  - 2. Grade: Pourable (P) or nonsag (NS).
  - 3. Class: 100/50.
  - 4. Uses Related to Exposure: Nontraffic (NT).

## 2.3 URETHANE JOINT SEALANTS

- A. Urethane Joint Sealant: ASTM C 920.
  - 1. Type: Single component (S) or multicomponent (M).
  - 2. Grade: Pourable (P) or nonsag (NS).
  - 3. Class: 100/50.
  - 4. Uses Related to Exposure: Nontraffic (NT)]

## 2.4 LATEX JOINT SEALANTS

- A. Latex Joint Sealant Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

## 2.5 PREFORMED JOINT SEALANTS

- A. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

## 2.6 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

## 2.7 JOINT SEALANT BACKING

- A. Cylindrical Sealant Backings: ASTM C 1330, any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

## 2.8 MISCELLANEOUS MATERIALS

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

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions.
  - 1. Remove laitance and form-release agents from concrete.
  - 2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.2 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 kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 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 in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of 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.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
- F. Acoustical Sealant Installation: Comply with ASTM C 919 and with manufacturer's written recommendations.
- G. 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 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
  - 1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
    - b. Perform 1 test for each 1000 feet (300 m) of joint length thereafter or 1 test per each floor per elevation.
  - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.4 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
  - 1. Joint Locations:
    - a. Control and expansion joints in brick pavers.
    - b. Isolation and contraction joints in cast-in-place concrete slabs.
    - c. Joints between plant-precast architectural concrete paving units.
    - d. Joints in stone paving units, including steps.
    - e. Tile control and expansion joints.
    - f. Joints between different materials listed above.
    - g. Other joints as indicated.

2. Joint Sealant: Preformed foam.
- B. Joint-Sealant Application: Exterior Insulation Finish Systems.
  1. Joint Locations:
    - a. EIFS wall assemblies.
  2. Joint Sealant: per section 072413
- C. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  1. Joint Locations:
    - a. Construction joints in cast-in-place concrete.
    - b. Joints between plant-precast architectural concrete units.
    - c. Control and expansion joints in unit masonry.
    - d. Joints in dimension stone cladding.
    - e. Joints in glass unit masonry assemblies.
    - f. Joints between metal panels.
    - g. Joints between different materials listed above.
    - h. Perimeter joints between materials listed above and frames of doors, windows and louvers
    - i. Control and expansion joints in ceilings and other overhead surfaces.
    - j. Other joints as indicated.
  2. Joint Sealant: Urethane.
- D. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
  1. Joint Locations:
    - a. Isolation joints in cast-in-place concrete slabs.
    - b. Control and expansion joints in stone flooring.
    - c. Control and expansion joints in brick flooring.
    - d. Control and expansion joints in tile flooring.
    - e. Other joints as indicated.
  2. Joint Sealant: Urethane.
- E. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
  1. Joint Locations:
    - a. Control and expansion joints on exposed interior surfaces of exterior walls.
    - b. Perimeter joints of exterior openings where indicated.
    - c. Tile control and expansion joints.
    - d. Perimeter joints between interior wall surfaces and frames of interior doors windows and elevator entrances.
    - e. Other joints as indicated.
  2. Joint Sealant: Latex.
- F. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
  1. Joint Sealant Location:
    - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
    - b. Tile control and expansion joints where indicated.
    - c. Other joints as indicated.
  2. Joint Sealant: Silicone.
- G. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
  1. Joint Location:
    - a. Acoustical joints where indicated.
    - b. Other joints as indicated.
  2. Joint Sealant: Acoustical.

END OF SECTION 07920



**DIVISION 8**

**DOORS AND WINDOWS**

08111	Hollow Metal Doors and Frames	08111-1 to 5
08141	Flush Wood Doors	08141-1 to 3
08411	Aluminum Framed Entrances and Storefronts	08411-1 to 8
08511	Aluminum Windows	08511-1 to 3
08710	Door Hardware	08710-1 to 7
08800	Glass & Glazing	08800-1 to 9



## SECTION 08111

## HOLLOW METAL DOORS AND FRAMES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Standard hollow metal doors and frames.

## 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. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required.
- E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

## 1.3 QUALITY ASSURANCE

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure as close to neutral pressure as possible according to NFPA 252/UBC Standard 7-2 or UL 10C.
  - 1. Temperature-Rise Limit: Where indicated At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- B. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9 UBC Standard 7-4 Label each individual glazed lite.
- C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784 UBC Standard 7-2.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Amweld Building Products, LLC.
  - 2. Benchmark; a division of Therma-Tru Corporation.
  - 3. Ceco Door Products; an Assa Abloy Group company.
  - 4. Curries Company; an Assa Abloy Group company.
  - 5. Deansteel Manufacturing Company, Inc.
  - 6. Firedoor Corporation.
  - 7. Fleming Door Products Ltd.; an Assa Abloy Group company.
  - 8. Habersham Metal Products Company.
  - 9. Kewanee Corporation (The).
  - 10. Mesker Door Inc.
  - 11. Pioneer Industries, Inc.
  - 12. Security Metal Products Corp.
  - 13. Steelcraft; an Ingersoll-Rand company.
  - 14. Windsor Republic Doors.
  - 15. Approved Equal

## 2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 (ZF120) metallic coating.
  - D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
    - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
  - E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
  - F. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
  - G. Mineral-Fiber Insulation: ASTM C 665, Type I.
  - H. Glazing: Division 08 Section "Glazing."
  - I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.
- 2.3 STANDARD HOLLOW METAL DOORS
- A. General: Comply with ANSI/SDI A250.8.
    - 1. Design: As indicated].
    - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
      - a. Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
      - b. Thermal-Rated (Insulated) Doors: R-value of not less than 12.3 deg F x h x sq. ft./Btu (2.166 K x sq. m/W) when tested according to ASTM C 1363.
    - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
    - 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
    - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
  - B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
    - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush)
  - C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
    - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush)
  - D. Hardware Reinforcement: ANSI/SDI A250.6.
- 2.4 STANDARD HOLLOW METAL FRAMES
- A. General: Comply with ANSI/SDI A250.8.
  - B. Exterior Frames: Fabricated from metallic-coated steel sheet.
    - 1. Fabricate frames with mitered or coped corners.
    - 2. Fabricate frames as knocked down unless otherwise indicated.
    - 3. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
  - C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
    - 1. Fabricate frames with mitered or coped corners.
    - 2. Fabricate frames as knocked down unless otherwise indicated.
    - 3. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions.
    - 4. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
    - 5. Frames for Wood Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
    - 6. Frames for Borrowed Lights: Same as adjacent door frame.
  - D. Hardware Reinforcement: ANSI/SDI A250.6.
- 2.5 FRAME ANCHORS
- A. Jamb Anchors:
    - 1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
    - 2. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
  - B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
    - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.
- 2.6 HOLLOW METAL PANELS
- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.
- 2.7 STOPS AND MOLDINGS
- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, same material as door face sheet.
  - B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.
  - C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, same material as frames.
- 2.8 LOUVERS
- A. Provide sightproof louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of 0.020-inch- (0.5-mm-) thick, cold-rolled steel sheet set into 0.032-inch- (0.8-mm-) thick steel frame.
- 2.9 ACCESSORIES
- A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
  - B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- (6.4-mm-thick by 25.4-mm-) wide steel.
  - C. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.
- 2.10 FABRICATION
- A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.
  - B. Hollow Metal Doors:
    1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
    2. Glazed Lites: Factory cut openings in doors.
    3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
  - C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
    1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
    2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
    3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
    4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
    5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
    6. Jamb Anchors: Provide number and spacing of anchors as follows:
      - a. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
        - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
        - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
        - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
        - 5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
      - b. Compression Type: Not less than two anchors in each jamb.
      - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
    7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
      - a. Single-Door Frames: Three door silencers.
      - b. Double-Door Frames: Two door silencers.
  - D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished.

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
  2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
  3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
  4. Provide loose stops and moldings on inside of hollow metal work.
  5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
- 2.11 STEEL FINISHES
- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
1. Shop Primer: ANSI/SDI A250.10.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  4. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
  6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

- c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
        - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
    - B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
      - 1. Non-Fire-Rated Standard Steel Doors:
        - a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
        - b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
        - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
        - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).
      - 2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
      - 3. Smoke-Control Doors: Install doors according to NFPA 105.
  - C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
    - 1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.
- 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. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 08111





## SECTION 08141

## FLUSH WOOD DOORS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Shop priming flush wood doors.
- B. Related Sections:
  - 1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

## 1.2 SUBMITTALS

- A. Product Data: For each type of door indicated. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
  - 1. Indicate dimensions and locations of mortises and holes for hardware.
  - 2. Indicate dimensions and locations of cutouts.
  - 3. Indicate requirements for veneer matching.
  - 4. Indicate doors to be factory finished and finish requirements.
  - 5. Indicate fire-protection ratings for fire-rated doors.
- C. Samples: For factory-finished doors.

## 1.3 QUALITY ASSURANCE

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors.
- B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Algoma Hardwoods, Inc.
  - 2. Ampco, Inc.
  - 3. Buell Door Company Inc.
  - 4. Chappell Door Co.
  - 5. Eagle Plywood & Door Manufacturing, Inc.
  - 6. Eggers Industries.
  - 7. Graham; an Assa Abloy Group company.
  - 8. Haley Brothers, Inc.
  - 9. Ideal Architectural Doors & Plywood.
  - 10. Ipik Door Company.
  - 11. Lambton Doors.
  - 12. Marlite.
  - 13. Marshfield Door Systems, Inc.
  - 14. Mohawk Flush Doors, Inc.; a Masonite company.
  - 15. Oshkosh Architectural Door Company.
  - 16. Poncraft Door Company.
  - 17. Vancouver Door Company.
  - 18. VT Industries Inc.
  - 19. Approved Equal

## 2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade:
  - 1. Heavy Duty unless otherwise indicated.
  - 2. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces , exits
  - 3. Standard Duty: Closets (not including janitor's closets), private toilets
  - 4. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- C. Structural-Composite-Lumber-Core Doors:
  - 1. Structural Composite Lumber: WDMA I.S.10.
    - a. Screw Withdrawal, Face: 700 lbf (3100 N).
- D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
  - 1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
- E. Mineral-Core Doors:
  - 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
  - 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
  - 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges

## 2.3 DOORS FOR OPAQUE FINISH

- A. Exterior Solid-Core Doors :
  - 1. Grade: Premium.
  - 2. Faces: Any closed-grain hardwood of mill option.
  - 3. Core: Either glued wood stave or structural composite lumber.
  - 4. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
  - 5. Adhesives: Type I per WDMA TM-6.
- B. Interior Solid-Core Doors
  - 1. Grade: Premium.
  - 2. Faces: Any closed-grain hardwood of mill option
  - 3. Core: Either glued wood stave or structural composite lumber
  - 4. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

## 2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

## 2.5 SHOP PRIMING

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

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
  - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
    - a. Comply with NFPA 80 for fire-rated doors.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08141



## SECTION 08411

## ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. Section Includes:
  - 1. Exterior storefront framing.
  - 2. Storefront framing for window walls.
  - 3. Storefront framing for ribbon walls.
  - 4. Storefront framing for punched openings.
  - 5. Exterior manual-swing entrance doors.

## 1.3 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

## 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
  - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
  - 2. Dimensional tolerances of building frame and other adjacent construction.
  - 3. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Thermal stresses transferring to building structure.
    - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    - d. Glazing-to-glazing contact.
    - e. Noise or vibration created by wind and by thermal and structural movements.
    - f. Loosening or weakening of fasteners, attachments, and other components.
    - g. Sealant failure.
    - h. Failure of operating units.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings. If not indicated, then contact Owners Representative for information and direction.
  - 2. Seismic Loads: As indicated on Drawings. If not indicated, then contact Owners Representative for information and direction.
  - 3. Blast Loads: As indicated on Drawings. If not indicated, then contact Owners Representative for information and direction..
- D. Deflection of Framing Members:
  - 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
  - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and

- glazing or other fixed components directly below them to less than 1/8 inch (3.2 mm) and clearance between members and operable units directly below them to less than 1/16 inch (1.5 mm).
- E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
    1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
    2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
    3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.
  - F. Story Drift: Provide aluminum-framed systems that accommodate design displacement of adjacent stories indicated.
    1. Design Displacement: As indicated on Drawings. If not indicated, then contact Owners Representative for information and direction..
    2. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.
  - G. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
  - H. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
  - I. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
    1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
    2. Interior Ambient-Air Temperature: 75 deg F (24 deg C).
  - J. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
  - K. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) when tested according to AAMA 1503.
- 1.5 SUBMITTALS
- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
  - B. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
    1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
    2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
  - C. Samples for Initial Selection: For units with factory-applied color finishes.
  - D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
  - E. Other Action Submittals:
    1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
  - F. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
    1. Detail fabrication and assembly of aluminum-framed systems.
    2. Include design calculations.
  - G. Qualification Data: For qualified Installer.
  - H. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
    1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
  - I. Welding certificates.

- J. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
  - K. Source quality-control reports.
  - L. Field quality-control reports.
  - M. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.
  - N. Warranties: Sample of special warranties.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
  - B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
  - C. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
  - D. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
    - 1. Do not revise intended aesthetic effects, as judged solely by Owners Representative, except with Owner Representative's approval. If revisions are proposed, submit comprehensive explanatory data to Owners Representative for review.
  - E. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
  - F. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
  - G. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
  - H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
    - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owners Representative specifically approves such deviations in writing.
    - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  - I. Preinstallation Conference: Conduct conference at Project site.
- 1.7 PROJECT CONDITIONS
- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.
- 1.8 WARRANTY
- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
    - 1. Failures include, but are not limited to, the following:
      - a. Structural failures including, but not limited to, excessive deflection.
      - b. Noise or vibration caused by thermal movements.
      - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      - d. Adhesive or cohesive sealant failures.
      - e. Water leakage through fixed glazing and framing areas.
      - f. Failure of operating components.
    - 2. Warranty Period: Two years from date of Substantial Completion.
  - B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
    - 1. Warranty Period: Five> years from date of Substantial Completion.
- 1.9 MAINTENANCE SERVICE
- A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer North America; an Alcoa company or comparable product by one of the following:
  1. Arcadia, Inc.
  2. EFCO Corporation.
  3. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.
  4. Approved Equal

### 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
  2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
  3. Extruded Structural Pipe and Tubes: ASTM B 429.
  4. Structural Profiles: ASTM B 308/B 308M.

### 2.3 FRAMING SYSTEMS

- A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  1. Construction: Thermally broken.
  2. Glazing System: Retained mechanically with gaskets on four sides
  3. Glazing Plane: As indicated
- B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  2. Reinforce members as required to receive fastener threads.
  3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- D. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials
- E. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
  1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

### 2.4 GLAZING SYSTEMS

- A. Glazing: As specified in Division 08 Section "Glazing."
- B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
- C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
  1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
    - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    - b. Color: Black

### 2.5 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.



1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: As indicated
  - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
3. Glazing Stops and Gaskets: Beveled snap-on, extruded-aluminum stops and preformed gaskets.
  - a. Provide nonremovable glazing stops on outside of door.

## 2.6 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.
  1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
  2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
  3. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf ((133 N)) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    - b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
  1. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- C. Opening-Force Requirements:
  1. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.
- D. Pivot Hinges: BHMA A156.4, Grade 1.
  1. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.
- E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
  1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
  2. Exterior Hinges: Stainless steel, with stainless-steel pin
  3. Quantities:
    - a. For doors up to 87 inches (2210 mm) high, provide 3 hinges per leaf.
    - b. For doors more than 87 and up to 120 inches (2210 and up to 3048 mm)high, provide 4 hinges per leaf.
- F. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- G. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- H. Manual Flush Bolts: BHMA A156.16, Grade 1.
- I. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
- J. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- K. Cylinders: BHMA A156.5, Grade 1.
  1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.
- L. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- M. Operating Trim: BHMA A156.6.
- N. Removable Mullions: BHMA A156.3, extruded aluminum.
  1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
- O. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.

- P. Concealed Overhead Holders: BHMA A156.8, Grade 1.
  - Q. Surface-Mounted Holders: BHMA A156.16, Grade 1.
  - R. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
  - S. Weather Stripping: Manufacturer's standard replaceable components.
    - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
    - 2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
  - T. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
  - U. Silencers: BHMA A156.16, Grade 1.
  - V. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).
  - W. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.
- 2.7 ACCESSORY MATERIALS
- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants."
    - 1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.
- 2.8 FABRICATION
- A. Form or extrude aluminum shapes before finishing.
  - B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
    - 1. Profiles that are sharp, straight, and free of defects or deformations.
    - 2. Accurately fitted joints with ends coped or mitered.
    - 3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
    - 4. Physical and thermal isolation of glazing from framing members.
    - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
    - 6. Provisions for field replacement of glazing from exterior
    - 7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
  - C. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
  - D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
    - 1. At exterior doors, provide compression weather stripping at fixed stops.
    - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
  - E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
    - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
    - 2. At exterior doors, provide weather sweeps applied to door bottoms.
  - F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
  - G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- 2.9 ALUMINUM FINISHES
- A. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
    - 1. Color: As selected by Owners Representative from full range of industry colors and color densities.
- 2.10 SOURCE QUALITY CONTROL
- A. Prepare test and inspection reports.

## PART 3 - EXECUTION

## 3.1 EXAMINATION

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

## 3.2 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
  - 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- F. Install glazing as specified in Division 08 Section "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

## 3.3 ERECTION TOLERANCES

- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
  - 1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
  - 2. Alignment:
    - a. Where surfaces abutt in line, limit offset from true alignment to 1/16 inch (1.5 mm).
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

## 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

## 3.5 ADJUSTING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

1. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch, measured to the leading door edge.

END OF SECTION 08411

## SECTION 08511

## ALUMINUM WINDOWS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes fixed aluminum-framed windows.

## 1.2 PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of minimum test size required by AAMA/WDMA 101/I.S.2/NAFS.
- B. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient;

## 1.3 SUBMITTALS

- A. Product Data: For each type of aluminum window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details
- C. Samples: For each exposed finish.
- D. Product Schedule: Use same designations indicated on Drawings.
- E. Field quality-control test reports.
- F. Product test reports.
- G. Maintenance data.

## 1.4 QUALITY ASSURANCE

- A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.
- B. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- C. Preinstallation Conference: Conduct conference at Project site.

## 1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of metals, other materials, and metal finishes beyond normal weathering.
    - e. Failure of insulating glass.
  - 2. Warranty Period:
    - a. Window: Two years from date of Substantial Completion.
    - b. Glazing: Five years from date of Substantial Completion.
    - c. Metal Finish: Five years from 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:

- B. Basis-of-Design Product: Subject to compliance with requirements, provide Kawneer; an Alcoa Company or a comparable product by one of the following:
1. All Seasons Windows & Doors; All Seasons Commercial Division, Inc.
  2. Boyd Aluminum Manufacturing.
  3. Custom Window Company.
  4. DeSCo Windows.
  5. EFCO Corporation.
  6. EXTECH Exterior Technologies, Inc.
  7. Fleetwood Aluminum Products, Inc.
  8. Gerkin Windows and Doors.
  9. Graham Architectural Products Corp
  10. Mannix; a division of Interstate Window Corp.
  11. Peerless Products Inc.
  12. Thermal Windows, Inc.
  13. TRACO.
  14. Wausau Window and Wall Systems.
  15. Winco Window Company.
  16. Window Technologies, Inc.; Century Manufacturing, Inc.
  17. YKK AP America Inc.
  18. Approved Equal

## 2.2 WINDOW

- A. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- B. Thermal Transmittance: Provide aluminum windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to NFRC 100.
1. U-Factor: 0.40 Btu/sq. ft. x h x deg F (2.3 W/sq. m x K) or less.
- C. Solar Heat-Gain Coefficient (SHGC): Provide aluminum windows with a whole-window SHGC maximum of 0.55, determined according to NFRC 200 procedures.

## 2.3 GLAZING

- A. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed aluminum window units.
- B. Glass : Clear, insulating-glass units, with low-E coating pyrolytic on second surface or sputtered on second or third surface, complying with Division 08 Section "Glazing."
- C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

## 2.4 FABRICATION

- A. Fabricate aluminum windows that are reglazable without dismantling sash or ventilator framing.
- B. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator.
- C. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- D. Provide water-shed members above side-hinged ventilators and similar lines of natural water penetration.
- E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.
- F. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch- (1.6-mm-) thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Finish to match window units. Provide subframes capable of withstanding design loads of window units.
- G. Glazing Stops: Provide snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.

## 2.5 ALUMINUM FINISHES

- A. Aluminum Anodic Finish: Class II, clear anodic coating complying with AAMA 611

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- 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. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- F. 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.
- G. Clean aluminum surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- H. 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.
- I. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08511





## SECTION 08710

## DOOR HARDWARE

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Commercial door hardware.
  - 2. Cylinders for doors specified in other Sections.
  - 3. Electrified door hardware.
- B. See Division 08 door sections for astragals and door silencers.

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Details of electrified door hardware, including wiring diagrams.
- C. Samples: For each exposed finish.
- D. Product certificates and test reports.
- E. Other Action Submittals:
  - 1. Door Hardware Sets: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as procedures and diagrams.
    - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
    - b. Content: Include the following information:
      - 1) Identification number, location, hand, fire rating, and material of each door and frame.
      - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
      - 3) Complete designations of every item required for each door or opening including name and manufacturer.
      - 4) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
  - 2. Keying Schedule: Prepared by or under the supervision of Installer detailing Owner's final keying instructions for locks.

## 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
  - 1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Owners Representative, and Owner about door hardware and keying.
- B. Source Limitations: Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
- C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252 and UBC Standard 7-2.
- D. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system.
- E. Preinstallation Conference: Conduct conference at Project site

## 1.4 DELIVERY, STORAGE, AND HANDLING

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

## 1.5 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

## 1.6 WARRANTY

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

## PART 2 - PRODUCTS

## 2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in door and frame schedule.
  1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products complying with BHMA standard referenced.
  2. All hardware to be Grade 2 unless indicated otherwise.

## 2.2 HINGES, GENERAL

- A. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- B. Hinge Base Metal: Unless otherwise indicated, provide the following:
  1. Exterior Hinges: Stainless steel, with stainless-steel pin.
  2. Interior Hinges: Steel, with steel pin.
  3. Hinges for Fire-Rated Assemblies: Steel, with steel pin.
- C. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.
- D. Fasteners: Comply with the following:
  1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
  2. Wood Screws: For wood doors and frames.
  3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.
  4. Screws: Phillips flat-head; machine screws (drilled and tapped holes) for metal doors and wood screws for wood doors and frames. Finish screw heads to match surface of hinges.

## 2.3 HINGES

- A. Butts and Hinges: BHMA A156.1.
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Available Manufacturers:
  1. Hager Companies (HAG).
  2. McKinney Products Company; an ASSA ABLOY Group company (MCK).
  3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  4. Approved Equal

## 2.4 SPRING HINGES

- A. Self-Closing Hinges: BHMA A156.17.
- B. Available Manufacturers:
  1. Hager Companies (HAG).
  2. McKinney Products Company; an ASSA ABLOY Group company (MCK).
  3. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  4. Approved Equal

## 2.5 PIVOTS AND PIVOT HINGES

- A. Pivots: BHMA A156.4.
- B. Self-Closing Pivot Hinges: BHMA A156.17.
- C. Available Manufacturers:
  - 1. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
  - 2. Hager Companies (HAG).
  - 3. McKinney Products Company; an ASSA ABLOY Group company (MCK).
  - 4. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
  - 5. Approved Equal

## 2.6 LOCKS AND LATCHES, GENERAL

- A. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).
- B. Latches and Locks for Means of Egress Doors: Comply with NFPA 101. Latches shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
- C. Electrified Locking Devices: BHMA A156.25.
- D. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors.
- E. Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
- F. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set.

## 2.7 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:
  - 1. Bored Locks: BHMA A156.2.
  - 2. Mortise Locks: BHMA A156.13.
  - 3. Interconnected Locks: BHMA A156.12.
- B. Bored Locks: BHMA A156.2, , Grade 2.
  - 1. Available Manufacturers:
    - a. Best Access Systems; Div. of The Stanley Works (BAS).
    - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - c. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
    - d. Approved Equal
- C. Mortise Locks: Stamped steel case with steel or brass parts; BHMA A156.13, Grade 2.
  - 1. Available Manufacturers:
    - a. Best Access Systems; Div. of The Stanley Works (BAS).
    - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - c. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
    - d. Approved Equal

## 2.8 AUXILIARY LOCKS AND LATCHES

- A. Auxiliary Locks: BHMA A156.5, Grade 2.
  - 1. Available Manufacturers:
    - a. Best Access Systems; Div. of The Stanley Works (BAS).
    - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - c. Schlage Commercial Lock Division; an Ingersoll-Rand Company (SCH).
    - d. Approved Equal

## 2.9 DOOR BOLTS

- A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors.
- B. Dustproof Strikes: BHMA A156.16, Grade 2.
- C. Surface Bolts: BHMA A156.16, Grade 2.
  - 1. Flush Bolt Heads: Minimum of 1/2-inch- (13-mm-) diameter rods of brass, bronze, or stainless steel with minimum 12-inch- (305-mm-) long rod for doors up to 84 inches (2134 mm) in height. Provide longer rods as necessary for doors exceeding 84 inches (2134 mm).
  - 2. Available Manufacturers:
    - a. Hager Companies (HAG).

- b. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
      - c. Approved Equal
    - D. Manual Flush Bolts: BHMA A156.16 , Grade 2, designed for mortising into door edge.
      - 1. Available Manufacturers:
        - a. Hager Companies (HAG).
        - b. Stanley Commercial Hardware; Div. of The Stanley Works (STH)
        - c. Approved Equal
- 2.10 EXIT DEVICES
- A. Exit Devices: BHMA A156.3, Grade 2.
  - B. Accessibility Requirements: Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22 N).
  - C. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.
  - D. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
  - E. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
  - F. Outside Trim: Lever with or without cylinder; material and finish to match locksets, unless otherwise indicated.
    - 1. Match design for locksets and latchsets, unless otherwise indicated.
  - G. Through Bolts: For exit devices and trim on metal doors, non-fire-rated wood doors and fire-rated wood doors.
- 2.11 LOCK CYLINDERS
- A. Standard Lock Cylinders: BHMA A156.5, Grade 2.
  - B. Cylinders: Manufacturer's standard tumbler type, constructed from brass or bronze, stainless steel, or nickel silver, and complying with the following:
    - 1. Number of Pins: Five.
    - 2. High-Security Grade: BHMA A156.5, Grade 1A, listed and labeled as complying with pick- and drill-resistant testing requirements in UL 437 (Suffix A).
  - C. Permanent Cores: Manufacturer's standard; finish face to match lockset; with interchangeable cores.
  - D. Construction Keying: Comply with the following:
    - 1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
      - a. Furnish permanent cores to Owner for installation.
  - E. Manufacturer: Same manufacturer as for locks and latches.
- 2.12 KEYING
- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference into grand master key system.
    - 1. Existing System: Master key or grand master key locks to Owner's existing system.
  - B. Keys: Nickel silver; p
    - 1. Quantity: In addition to one extra key blank for each lock, provide three cylinder change keys and five grand master keys
- 2.13 ACCESSORIES FOR PAIRS OF DOORS
- A. Carry-Open Bars: Provide carry-open bars for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
    - 1. Material: Polished brass or bronze, with strike plate.
- 2.14 CLOSERS
- A. Accessibility Requirements: Comply with the following maximum opening-force requirements:
    - 1. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
    - 2. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
    - 3. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

- B. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
  - C. Hold-Open Closers/Detectors: Coordinate and interface integral smoke detector and closer device with fire alarm system.
  - D. Flush Floor Plates: Provide finish cover plates for floor closers unless thresholds are indicated. Match door hardware finish, unless otherwise indicated.
  - E. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
  - F. Surface Closers: BHMA A156.4, Grade 2. Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
    - 1. Available Manufacturers:
      - a. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
      - b. Dor-O-Matic; an Ingersoll-Rand Company (DOR).
      - c. Norton Door Controls; an ASSA ABLOY Group company (NDC).
      - d. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
      - e. Approved Equal
  - G. Closer Holder Release Devices: BHMA A156.15.
    - 1. Life-Safety Type: On release of hold open, door becomes self-closing. Automatic release is activated by smoke detection system and/or loss of power].
    - 2. Available Manufacturers:
      - a. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
      - b. LCN Closers; an Ingersoll-Rand Company (LCN).
      - c. Norton Door Controls; an ASSA ABLOY Group company (NDC).
      - d. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
      - e. Approved Equal
- 2.15 PROTECTIVE TRIM UNITS
- A. Size: 1-1/2 inches (38 mm) less than door width on push side and 1/2 inch (13 mm) less than door width on pull side, by height specified in door hardware sets.
  - B. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:
    - 1. Material: 0.050-inch- (1.3-mm-) thick aluminum].
    - 2. Available Manufacturers:
      - a. Hager Companies (HAG).
      - b. IVES Hardware; an Ingersoll-Rand Company (IVS).
      - c. Approved Equal
- 2.16 STOPS AND HOLDERS
- A. Stops and Bumpers: BHMA A156.16 , Grade 2.
    - 1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
  - B. Mechanical Door Holders: BHMA A156.16 , Grade 2.
  - C. Electromagnetic Door Holders: BHMA A156.15.
  - D. Silencers for Door Frames: BHMA A156.16, Grade 1; neoprene or rubber; fabricated for drilled-in application to frame.
  - E. Available Manufacturers:
    - 1. DORMA Architectural Hardware; Member of The DORMA Group North America (DAH).
    - 2. Dor-O-Matic; an Ingersoll-Rand Company (DOR).
    - 3. Hager Companies (HAG).
    - 4. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SGT).
    - 5. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
    - 6. Approved Equal
- 2.17 DOOR GASKETING
- A. Standard: BHMA A156.22.

- B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
    - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
    - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
    - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
  - C. Smoke-Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke-control ratings indicated, based on testing according to UL 1784.
    - 1. Provide smoke-labeled gasketing on rated doors and on smoke-labeled doors.
  - D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
  - E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
  - F. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
  - G. Available Manufacturers:
    - 1. Hager Companies (HAG).
    - 2. Pemko Manufacturing Co. (PEM).
    - 3. Reese Enterprises (RE).
    - 4. Approved Equal
- 2.18 THRESHOLDS
- A. Standard: BHMA A156.21.
  - B. Accessibility Requirements: Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high]
  - C. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch (13 mm) high.
  - D. Available Manufacturers:
    - 1. Hager Companies (HAG).
    - 2. Pemko Manufacturing Co. (PEM).
    - 3. Reese Enterprises (RE).
    - 4. Approved Equal
- 2.19 MISCELLANEOUS DOOR HARDWARE
- A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.
  - B. Auxiliary Hardware: BHMA A156.16, Grade 1 unless Grade 2 is indicated
    - 1. Available Manufacturers:
      - a. Hager Companies (HAG).
      - b. Stanley Commercial Hardware; Div. of The Stanley Works (STH).
      - c. Approved Equal
- 2.20 FABRICATION
- A. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
  - B. Fasteners: Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
    - 1. Comply with NFPA 80 for fasteners of door hardware in fire-rated applications.
  - C. Finishes: BHMA A156.18, as indicated in door hardware sets.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Steel Doors and Frames: Comply with DHI A115 Series. Drill and tap doors and frames for surface-applied door hardware according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.
- C. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise indicated or required to comply with governing regulations.
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
  - 2. Custom Steel Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
  - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- E. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
- G. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
  - 2. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

## 3.2 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

END OF SECTION 08710





## SECTION 08800

## GLASS AND GLAZING

## PART 1 GENERAL

## 1.1 SUMMARY:

- A. Extent of glass and glazing work is indicated on drawings.
- B. Types of work in this section include glass and glazing for:
  - 1. Exterior entrance, and storefront construction, vision glass.
  - 2. Exterior fixed window construction, vision and glass.
  - 3. Interior fixed window construction vision and wired glass
  - 4. Doors
  - 5. Mirror glass with sanded edges
  - 6. Glazing accessories, materials, gaskets, setting and edge blocks.
- C. Refer to "Section 08410 Aluminum Entrance, Curtainwall, Storefront and Windows" for related information and requirements.

## 1.2 SYSTEM DESCRIPTION:

- A. Provide glass and glazing that has been produced, fabricated and installed to withstand normal thermal movement, wind loading and impact loading (where applicable), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and airtight, deterioration of glass and glazing materials and other defects in the work.
  - 1. Normal thermal movement is defined as that resulting from an ambient temperature range of 120 deg. F (67 deg. C) and from a consequent temperature range within glass and glass framing members of 180 deg. F (100 deg. C).
  - 2. Deterioration of insulated glass is defined as failure of hermetic seal due to other causes than breakage which results in intrusion of dirt or moisture, internal condensation or fogging, deterioration of protected internal glass coating, if any, resulting from seal failure, and any other visual evidence of seal failure or performance.
  - 3. Deterioration of coated glass is defined as the development of manufacturing defects including peeling, cracking or other indications of deterioration in metallic coating due to normal conditions of use.

## 1.3 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Section 01300 "Submittals"
- B. Product Data: Submit manufacturer's technical data for:
  - 1. Each glazing material and fabricated glass product required, including installation and maintenance instructions.
- C. Samples: Submit, for verification purposes, 12" square samples of each type of glass indicated, and 12" long samples of each color required for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.
- D. Glass and Glazing Certificates:
  - 1. Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements, and the non-stick coating is compatible.
  - 2. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.
- E. Sealant Certificates: Provide certificates signed by the sealant manufacturer certifying that he has evaluated the completed entrance, storefront and window samples, calculations and shop drawings. The certification shall include the following:
  - 1. The products included are compatible with the system and adjacent construction and the material in contact with the sealant after 21 days' exposure to UV (2000 to 4000 micro watt radiation).
  - 2. The products included conform to the specifications and are properly suited for the application intended.

- F. Test Reports: Provide test reports certified by the sealant manufacturer which include:
1. Test data of adhesion to production samples of metal panel, frame and glass tested in accordance with American Society of Testing and Materials (ASTM) C 794.
  2. Stress statements that when exposed to the specified wind loads, the stress on the sealant does not exceed 20 psi or a 6 to 1 safety factor for the sealant dimension per the design details, including substantial calculations.
- G. Compatibility and Adhesion Test Report:
1. Submit statement from sealant and glass manufacturer indicating that glass, glazing materials and frame system material have been tested for compatibility and adhesion with glazing sealants.
  2. Submit report from sealant manufacturer interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion..
- 1.4 QUALITY ASSURANCE:
- A. Glass shall comply with the following:
1. The statistical probability of breakage due to wind pressures shall not exceed 8 lites per 1,000 (see PPG Publication G-7060).
  2. The probability of breakage due to thermal stresses shall not exceed 8 lites per 1,000.
  3. Insulated glass units shall not experience:
    - a. Fogging, wetting or staining within the sealed space.
    - b. Adhesive or cohesive failure of primary and secondary seals.
    - c. Spacer corrosion or migration.
    - d. Changes in air space dimension caused by reaction of desiccant with entrapped air.
  4. Center deflection of glass shall not exceed 1" except where approved prior to installation.
  5. Glass provided for the test mock-up shall be identical; (including strength) to the glass provided for the corresponding zone on the actual building. Mock-up glass which breaks shall be replaced with the same type glass and the tests continued. Repeated glass breakage shall constitute a failure.
  6. Spandrel glass shall remain in place if broken and comply with fall-out resistance test described in ASTM C-1048.
  7. Glass manufacturer shall perform an analysis and calculation to determine which glass needs to be heat strengthened (HS). Specific note and consideration shall be given to glass areas which are shaded by the building sunscreens, canopies and overhangs.
- B. Glazing Standards: Comply with recommendations of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
- C. Safety Glazing Standard: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with American National Standards Institute (ANSI) Z97.1 and testing requirements of 16 CFR Part 1201 for category II materials.
1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- D. Single Source Responsibility for Glass: To ensure consistent quality of appearance and performance, provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.
- E. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component pane of units with appropriate certification label of inspecting and testing organization indicated below:
1. Insulating Glass Certification Council (IGCC).
  2. Associated Laboratories, Inc. (ALI).
- F. Water Leakage Test: Conduct water leakage test according to the requirements listed in Section 08410, "Aluminum Entrance, Curtainwall, Storefront and Windows".

- G. Preconstruction Compatibility and Adhesion Testing: Submit samples of all glass, gaskets, glazing accessories, and glass framing members proposed for use in contact with, or proximity of, glazing sealants, to sealant manufacturer for compatibility and adhesion testing in accordance with sealant manufacturer's standard testing methods and the following requirements:
  - 1. Submit not less than 3 pieces of each type and finish of glass framing member and of each type, class, kind, condition, and form (monolithic, laminated, insulating units) of glass for adhesion testing and one sample of substrates (gaskets, setting blocks and spacers) for compatibility testing.
  - 2. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
  - 3. Investigate materials failing compatibility or adhesion tests and obtain sealant manufacturer's written recommendations for corrective measure, including use of specially formulated primers.
- H. Preinstallation Conference: Before beginning entrance, curtainwall, storefront & window, and glass installation, conduct a preinstallation conference at the Project site with the entrance/curtainwall/storefront/window system, and glazing manufacturers, installers, Owner's Representative and other interested parties.
  - 1. Review areas of potential interference and conflicts, scheduling & sequencing and coordinate layout and support provisions for interfacing work.
  - 2. Coordinate with provisions of Section 01200 "Project Meetings."
- I. See specification Section 08410 "Aluminum Entrance, Curtainwall, Storefronts and Windows" for additional requirements and Contractor Responsibilities.

1.5 DELIVERY, STORAGE, AND HANDLING:

- A. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

1.6 PROJECT CONDITIONS:

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by either sealant or glazing material manufacturer or when joint substrates are wet due to rain, frost, condensation or other causes.

1.7 WARRANTY:

- A. Any warranty specified in other sections of the contract specifications notwithstanding, the Contractor will be required to furnish a written 5-year warranty, effective from the date of substantial completion, the intent of which is to provide the Owner with a quality, watertight system installation during that period.
- B. The products listed in this specification shall be provided with the same warranties with the same requirements as those listed in Section 08410 "Entrance, Curtainwall, Storefronts and Windows".
- C. In addition to the warranties listed above and in Section 08410 "Entrance, Curtainwall, Storefronts and Windows", the following products & portions of the system shall be provided with the extended warranty:
  - 1. Insulated glass air space integrity, 10 years.
  - 2. Reflective coating on glass, 10 years.
  - 3. Silicone sealant material, 20 years.
  - 4. Spandrel glass integrity, 10 years.
- D. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and is in addition to and runs concurrent with other warranties made by the Contractor under requirements of the Contract Documents.
- E. All warranties are to be fully transferable should change in building ownership occur, and shall be subject to and interpreted in accordance with the laws of the State of Illinois.

## PART 2 PRODUCTS

## 2.1 MANUFACTURER:

- A. Products are identified by using product designation numbers of one manufacturer. An asterisk (\*) after the manufacturer's name indicates whose product designations are used for purposes of establishing minimum requirements. Provide either the product designated or the comparable product of one of the other manufacturers listed, which complies with the requirements included in this section.
- B. Subject to compliance with requirements, provide products of one of the following manufacturers:
  - 1. Visteon, Inc.
  - 2. Guardian Industries Corp.
  - 3. A.F.G.
  - 4. Or approved equal

## 2.2 GLASS PRODUCTS, GENERAL:

- A. GENERAL
  - 1. Glass shall conform to IBC, ASTM C-1036, clear float Type I (transparent) Class I (clear) quality q3 (glazing select), ASTM C-1048 if heated-treated, and ANSI Z97.1 for safety glazing.
  - 2. Locate safety glass in conformance with CPSC 16 CFR 1201.
  - 3. Provide heat-strengthened glass as required to withstand thermal stresses and to meet the design pressures. Tempered glass will be permitted only when required for safety glazing or fireman knock-out panels. Tong marks are not permissible.
  - 4. Glass lites which contain material defects are not acceptable. Installed glass which breaks due to a material defect shall be replaced at no cost to the Owner during the warranty period. Nickel sulfide inclusions are considered defects.
  - 5. All glass will have removable labels which will remain on the glass until accepted by the Owner's Representative and then be removed.
- B. Primary Glass Standard: Provide primary glass which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.
- C. Heat-Strengthened Treated Glass Standard: Provide heat-strengthened glass which complies with ASTM C 1048 requirements (except reduce the allowable surface compression shown to 3500 psi minimum and 7500 psi maximum), including those indicated by reference to kind, condition, type, quality, class and, if applicable, form, finish, and pattern.
- D. Tempered Glass Standard: Provide flat, fully tempered glass in thickness indicated for doors, sidelights, and transoms. Comply with requirements of ASTM C 1048 for kind FT (fully tempered), Condition A (uncoated surfaces), type I (transparent), Class 1 (clear) glass.
- E. Sizes: Fabricate glass to sizes required for glazing openings indicated, with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thicknesses indicated. All glass will be factory cut to size, with clean-cut edges as defined by PPG Industries Technical Service Reports 104C and 130.
- F. Types of Glass Required:
  - 1. Exterior Entrance, Curtainwall, Storefront and Window Vision Glass: 1" Insulated High Performance Reflective Glass. Provide tempered glass where required.
  - 2. Storefront Door Glass & All Glass Entry Doors:
  - 3. Mirrored Glass, ¼", All restrooms

## 2.3 PRIMARY GLASS PRODUCTS:

- A. Clear Float Glass: Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select).
  - 1. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient and visible reflectance.
- B. Tinted Float Glass: Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), and as follows:
  - 1. Refer to coated glass product requirements for tint and performance characteristics of coated tinted glass for single glazing relative to visible light transmittance, U-values, shading coefficient and visible reflectance.

2. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient and visible reflectance.

#### 2.4 HEAT-TREATED GLASS PRODUCTS:

- A. Manufacturing Process: Manufacture heat-treated glass as follows:
  1. By horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed, unless otherwise indicated.
- B. Uncoated Clear Heat-Treated Float Glass: Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear), Quality q3 (glazing select), kind FT (fully tempered) where required.
- C. Uncoated Heat-Treated Spandrel Glass: Condition A (uncoated glass), Type I (transparent glass, flat), Quality q3 (glazing select), with color matching those indicated under coated/tinted glass products for vision units, and complying with the following additional requirements:
  1. Kind HS (heat strengthened), unless required to be tempered.
  2. Kind FT (fully tempered) where required.
  3. Factory-laminate manufacturer's standard opacifier of Polyester sheet, where back-up materials are adhered directly to back of spandrel unit.
  4. Any spandrel glass which breaks shall remain in place in its framing members until it is replaced.
- D. Coated Tinted Heat-Treated Float Glass: Condition C (other coated glass), Type I (transparent glass, flat), Class 2 (tinted heat absorbing and light reducing), Quality q3 (glazing select), with coating type and performance characteristics complying with requirements specified under coated glass products; kind as indicated below:
  1. Kind HS (heat strengthened), unless required to be tempered.
  2. Kind FT (fully tempered) where required.
- E. Coated Tinted Heat-Treated Spandrel Glass: Condition C (other coated glass), Type I (transparent glass, flat), Quality q3 (glazing select), with class, tint, coating type, location and color matching those indicated under coated glass products for vision units, and complying with the following additional requirements:
  1. Kind HS (heat strengthened), unless required to be tempered.
  2. Kind FT (fully tempered) where required.
  3. Factory-laminate manufacturer's standard opacifier of Polyester sheet, where back-up materials are adhered directly to back of spandrel unit.
  4. Any spandrel glass which breaks shall remain in place in its framing members until it is replaced.
- F. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6 mm (0.23 inch) thick; of form and mesh pattern indicated below:
  1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:
    - a. Mesh m2 (square).

#### 2.5 COATED GLASS PRODUCTS FOR SINGLE GLAZING APPLICATIONS:

- A. General: Performance characteristics designated for coated glass products are nominal values based on manufacturer's published test data for 1/4" thick glass products, unless otherwise indicated. Refer to primary and heat-treated glass product requirements relating to properties of glass products to which coatings are applied.
  1. U-values indicated are expressed in the number of Btu's per hour per sq. ft. per degree F difference.
  2. Provide tinted heat-treated coated spandrel glass of kind scheduled and at location indicated. Provide heat-strengthened units where recommended by manufacturer for application indicated and tempered where coated safety glass is designated or required. (6000 PSI maximum allowable surface compression stress).

#### 2.6 SEALED INSULATING GLASS UNITS:

- A. General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E 774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.

- B. Performance characteristics designated for insulating glass are nominal values based on manufacturer's published test data for units with 1/4" thick panes of glass and 1/2" thick air space.
1. U-values indicated are expressed in the number of Btu's per hour per sq. ft. per degree F difference.
  2. Provide clear float glass and uncoated clear heat-treated float glass of kind scheduled and at location indicated. Provide heat-strengthened units where recommended by manufacturer for application indicated and tempered where safety glass is designated or required.
  3. Performance Classification per ASTM E 774: Class A.
    - a. Thickness of Each Pane: 1/4".
    - b. Air Space Thickness: 1/2".
    - c. Sealing System: Dual seal; primary and secondary sealant: manufacturer's standard materials.
    - d. Spacer Material: Aluminum, mill finish compatible with and adhered to unit seals.
  4. Desiccant: Manufacturer's standard; either molecular sieve or silica gel or blend of both.
  5. Corner Construction: Manufacturer's standard three bent and one soldered corner construction.
- 2.7 MISCELLANEOUS GLAZING MATERIALS:
- A. Provide glazing sealants, gaskets, splines and other glazing materials which are recommended and guaranteed by the manufacturer to remain permanently elastic, non-shrinking, non-migrating and weatherproof for the life of the building. Comply with recommendations of sealant, gasket and glass manufacturers for selection of glazing materials which have performance characteristics suitable for the applications indicated, and for conditions at the time of installation. Select materials which are compatible with surfaces contacted in the installation, as demonstrated by testing and field experience.
- B. Compatibility: Provide materials with proven record of compatibility with surfaces contacted in installation.
- C. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- D. Setting Blocks:
1. Setting blocks shall be black solid extruded neoprene, with a hardness of 85+/-5 durometer shore A.
  2. Extruded silicone setting blocks are required where they are in contact with silicone sealant, and are optional elsewhere and shall be compatible shore A.
  3. Setting blocks and setting block chairs shall be secured against migration.
  4. Setting blocks are to be sized and located in accordance with FGMA Glazing Manual. Minimum of 4" in length.
- E. Spacers: Neoprene compatible with glazing sealant and other products, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.
- F. Edge Blocks:
1. Provide edge blocks to limit lateral movement of each lite. Blocks shall be 65+/-5 durometer shore A solid neoprene.
  2. Edge blocks are not required where an individual glass lite is continuously sealed with silicone at its two vertical edges.
  3. Edge blocks are to be sized and located in accordance with FGMA Glazing Manual.
- G. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength for 25% deflection.
- H. Adhesive: Type M, F solvent for bonding mirror to gypsum board walls.
- I. Glazing Gaskets: Glazing gaskets shall comply with requirements as specified in Section 08410 "Aluminum Entrance, Curtainwall, Storefronts and Windows".
- 2.8 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES:
- A. General: Provide products of type indicated and complying with the following requirements:
1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
  2. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes which have performance characteristics suitable for applications indicated and conditions at time of installation. Structural Glazing sealant shall be silicone sealant specifically design and tested for structural glazing.

3. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.
  4. Colors: As selected by Construction manager from manufacturers full range of colors.
  5. Locate and identify all sealants by product name on shop drawings.
  6. All sealant shall be tooled as a separate operation after application, to fill joints and provide a smooth surface.
  7. In using specified sealants or approved alternated, strictly observe the printed instructions of the sealant manufacturer regarding joint size limitations, mixing, priming and application. Where printed instructions are indefinite on the use of a primer, consult sealant manufacturer. Unless printed instructions advise to the contrary, do not apply sealants when substrates are wet or when the temperature is below 40 degrees F.
  8. Sealant back-up material shall be polyethylene foam, sponge neoprene conforming to ASTM C509, or urethane foam as recommended by sealant manufacturer.
  9. Shop and field sealants:
    - a. Silicone sealants are acceptable materials for nonstructural shop or field application as part of the assembly and installation procedure.
    - b. Structural glazing sealant shall be high strength silicone, specifically designed and tested for structural glazing.
    - c. One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A, and, as applicable to uses indicated, O; and complying with the following requirements for modulus and additional joint movement capability.
  10. Medium Modulus: Tensile strength of not less than 45 nor more than 75 psi at 100 percent elongation when tested per ASTM D 412 after 14 days at 77 deg. F (20 deg. C) and 50 percent relative humidity.
  11. Additional capability, when tested per ASTM C 719 for adhesion and cohesion under maximum cyclic movement, to withstand 50 percent increase and decrease of joint width, as measured at time of application, and remain in compliance with other requirements of ASTM C 920.
- B. Preformed Butyl-Polyisobutylene Glazing Tape: Provide manufacturer's standard solvent-free butyl-polyisobutylene formulation with a solids content of 100 percent; complying with AAMA A 804.1; in extruded tape form; non-staining and non-migrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without continuous spacer rod as recommended by manufacturers of tape and glass for application indicated.
- C. Available Products: Subject to compliance with requirements, provide one of the following products for each sealant of glazing tape listed:
1. One-Part Non-Acid Curing Medium-Modulus Silicone Glazing Sealant:
    - a. "Dow Corning 995"; Dow Corning Corp.
    - b. General Electric Corp.
    - c. Pecora
  2. Preformed Butyl-Polyisobutylene Glazing Tape Without Spacer Rod:
    - a. "Chem-Tape 40"; Bostik Construction Products Div.
    - b. "Extru-Seal"; Pecora Corp.
    - c. "PTI 303" Glazing Tape; Protective Treatments, Inc.
    - d. "Tremco 440 Tape"; Tremco Inc.
    - e. Or Equal
  3. Preformed Butyl-Polyisobutylene Glazing Tape With Spacer Rod:
    - a. "Chem-Tape 60"; Bostik Construction Products Div.
    - b. "Shim-Seal"; Pecora Corp.
    - c. "PTI 303" Shim Tape; Protective Treatments, Inc.
    - d. "Pre-shimmed Tremco 440 Tape"; Tremco Inc.
    - e. Or Equal

## PART 3 EXECUTION

## 3.1 EXAMINATION:

- A. Require Glazier to inspect work for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system to the exterior; for existence of minimum required face or edge clearances; and for effective sealing of joinery. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected. Proceeding with the work signifies that the Contractor accepts the substrate, surfaces & conditions and any problems related to the substrate shall be repaired to the satisfaction of the Owner's Representative without any additional cost to the Owner.

## 3.2 PREPARATION:

- A. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use. Solvents shall be compatible with a aluminum, glass and glazing materials.

## 3.3 GLAZING, GENERAL:

- A. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.
- B. Glazing channel dimensions shall be as required to provide for necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by job conditions at time of installation. Except as otherwise specified, comply with FGMA Glazing Manual. Provide a minimum nominal glass bite of 1/2". Where glass bite will be reduced by frame thermal movements, increase nominal glass bite to provide 1/2" bite when splice joints are fully opened.
- C. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

## 3.4 GLAZING:

- A. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6" from corner, unless otherwise required. Set blocks in thin course of sealant which is acceptable for heel bead use.
- B. Provide spacers inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8" minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.
- C. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.
- D. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.
- E. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and from adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.
- F. Force sealants into glazing channels to eliminate voids and to ensure complete "wetting" or bond of sealant to glass and channel surfaces.
- G. Tool exposed surfaces of sealants to provide a substantial "wash" away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.



- H. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not "walk" out when installation is subjected to movement.
- I. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; coordinate additional length requirements with manufacturer prior to cutting of gaskets; seal corner joints and butt joints with sealant recommended by gasket manufacturer. Coordinate this requirement with requirements in Section 08410 "Aluminum Entrance, Curtainwall, Storefront and Windows". Where gaskets with fully welded corners are specified, that requirement shall take precedence.
- J. Lock-Strip Gasket Glazing: Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.
- K. Provide concealed hangers for mirrored glass.

### 3.5 PROTECTION AND CLEANING:

- A. Protect exterior glass from breakage immediately upon installation by use of crossed streamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.
- C. Protect glass from damage from other construction operations by immediately after installation covering glass and frame with protection barrier (plastic sheet or similar) which is substantial enough to reduce damage from other construction. Maintain protection barrier until immediately prior to cleaning of glass for substantial completion.
- D. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.
- E. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism. This glass shall be replaced at no additional cost to the Owner.
- F. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of Substantial Completion in each area of project. Wash glass by method recommended by glass manufacturer.
- G. Continued Cleaning: 3 months after Substantial Completion, the contractor shall return to the project and reclean all system and glass surfaces. Any damaged caused by leaching, staining or leakage from the building or its components shall be repaired or replaced at no additional cost to the owner. Determination of damage and acceptable repair shall be at the sole discretion of the Owner's Representative

END OF SECTION 08800



**DIVISION 9**

**FINISHES**

09290	Gypsum Board	09290-1 to 4
09511	Acoustical Panel Ceilings	09511-1 to 4
09651	Resilient Base and Accessories	09651-1 to 5
09681	Sheet Carpeting	09681-1 to 3
09911	Exterior Painting	09911-1 to 3
09912	Interior Painting	09912-1 to 5



## SECTION 09290

## GYPSUM BOARD

## PART 1 - GENERAL

## 1.1 SUMMARY

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

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

## 1.3 QUALITY ASSURANCE

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

## 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.
    - b. G-P Gypsum.
    - c. National Gypsum Company.
    - d. USG Corporation.
    - e. Approved Equal
- B. Regular Type:
  - 1. Thickness: 1/2 inch (12.7 mm) or as shown on drawings.
  - 2. Long Edges: Tapered.
- C. Type X:
  - 1. Thickness: 5/8 inch (15.9 mm) or as shown on drawings.
  - 2. Long Edges: Tapered
- D. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
  - 1. Thickness: 1/2 inch (12.7 mm).
  - 2. Long Edges: Tapered.
- E. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
  - 1. Core: 5/8 inch (15.9 mm), Type X.
  - 2. Long Edges: Tapered.

## 2.2 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.
  - 1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum.
  - 2. Core: 1/2 inch (12.7 mm), regular type

## 2.3 TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M.
  - 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.
    - b. G-P Gypsum.

- c. National Gypsum Company.
      - d. USG Corporation.
      - e. Approved Equal
    - 2. Core: 1/2 inch (12.7 mm), regular type
  
  - 2.4 TRIM ACCESSORIES
    - A. Interior Trim: ASTM C 1047.
      - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet
      - 2. Shapes:
        - a. Cornerbead.
        - b. Bullnose bead.
        - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
        - d. L-Bead: L-shaped; exposed long flange receives joint compound.
        - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
        - f. Expansion (control) joint.
        - g. Curved-Edge Cornerbead: With notched or flexible flanges.
- 
- 2.5 JOINT TREATMENT MATERIALS
  - A. General: Comply with ASTM C 475/C 475M.
  - B. Joint Tape:
    - 1. Interior Gypsum Wallboard: Paper.
    - 2. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
    - 3. Tile Backing Panels: As recommended by panel manufacturer.
  - C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
    - 1. Prefilling: At open joints[, and damaged surface areas, use setting-type taping compound.
    - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping or drying-type, all-purpose compound.
      - a. Use setting-type compound for installing paper-faced metal trim accessories.
    - 3. Fill Coat: For second coat, use setting-type, sandable topping compound.
    - 4. Finish Coat: For third coat, use setting-type, sandable topping] compound.
    - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound .
  - D. Joint Compound for Exterior Applications:
    - 1. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
  - E. Joint Compound for Tile Backing Panels:
    - 1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
- 
- 2.6 AUXILIARY MATERIALS
  - A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
  - B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
    - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
    - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
    - 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
  - D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
    - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
  - E. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
    - 1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

### 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- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- 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: As indicated on Drawings
  - 2. Type X: As indicated on Drawings and/or where required for fire-resistance-rated assembly
  - 3. Moisture- and Mold-Resistant Type: In toilet rooms, janitor rooms and kitchens or other areas subject to moisture

#### 3.3 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 Owners Representative for visual effect.
- C. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. Bullnose Bead: Use where indicated
  - 3. LC-Bead: Use at exposed panel edges
  - 4. L-Bead: Use where indicated.
  - 5. U-Bead: Use where indicated.
  - 6. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. LC-Bead: Use at exposed panel edges.

#### 3.4 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 3: Where indicated on Drawings.
  - 4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.
  - 5. Level 5: Where indicated on Drawings>.
    - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

3.5 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 09290



## SECTION 9511

## ACOUSTICAL PANEL CEILINGS

## PART 1 GENERAL

## 1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

## 1.2 SUMMARY:

- A. Extent of each type of acoustical ceiling is shown and scheduled on drawings.
- B. Types of acoustical ceilings specified in this section include the following:
  - 1. Acoustical panel ceilings, exposed suspension.

## 1.3 QUALITY ASSURANCE:

- A. Coordination of Work: Coordinate layout and installation of acoustical ceiling panels and suspension system components with other work supporting or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components and partition system.
- B. Pre-installation Conference: Conduct conference at Project site.

## 1.4 SUBMITTALS:

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 "Submittals"
- B. Product Data: Submit manufacturer's technical data for each type of acoustical ceiling panel and suspension system required.
- C. Samples: Submit samples of each type of ceiling tile and ceiling grid/suspension system.

## 1.5 DELIVERY, STORAGE AND HANDLING:

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

## 1.6 PROJECT CONDITIONS:

- A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

## 1.7 EXTRA MATERIALS:

- A. Deliver extra materials to Owner. Furnish extra materials described below matching products installed, packaged with protective covering for storage and identified with appropriate labels.
  - 1. Acoustical Ceiling Panels: Furnish quantity of full size units equal to 2.0% of amount installed.
  - 2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2.0% of amount installed.

## PART 2. PRODUCTS

## 2.1 ACOUSTICAL PANELS:

- A. Manufacturer: An Asterisk (\*) after the manufacturers name indicates whose product designations are used for purpose of establishing minimum requirements & detailing on the drawings. Provide either the product designated or the comparable product of one of the other manufacturers listed, which complies with the requirements included in this section. Provide written analysis/ comparison of product being provided with designated product. Subject to compliance with requirements, provide products by one of the following:
1. Armstrong
  2. U.S. Gypsum
  3. Or Equal
- B. Acoustical material shall be Class A
- C. Noise Reduction Coefficient, NRC, shall be measured according to American Society of Testing and Materials (ASTM) C 423, "Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method". Materials specified to be tested on mounting E-400 unless otherwise noted (see ASTM procedure E795).
- D. Ceiling Sound Transmission Class, STC, shall be measured according to AMA 1-II, "Ceiling Sound Transmission Test by Two-Room Method".
- E. Panels:
1. Armstrong "Cortega", Item #770, 24" x 24" x 5/8" straight edge lay-in or equal
    - a. NRC Range: .50 - .60.
    - b. CAC Range: 35-40
    - c. Light Reflectance: 75%-80%  
Flame Spread: 25

## 2.2 METAL SUSPENSION SYSTEMS:

- A. Manufacturer: An Asterisk after the manufacturers name indicates whose product designations are used for purpose of establishing minimum requirements & detailing on the drawings. Provide either the product designated or the comparable product of one of the other manufacturers listed, which complies with the requirements included in this section. Provide written analysis/ comparison of product being provided with designated product. Subject to compliance with requirements, provide products by one of the following:
1. Armstrong
  2. Donn
  3. Chicago Metallic Corporation
  4. Or Equal
- B. General: Suspension systems shall be 1 1/2" with 15/16" Tee, heavy duty class standard type, hung directly from structure above.
- C. Standard for Metal Suspension Systems: Provide metal suspension systems of type, structural classification and finish indicated which comply with applicable ASTM C 635 requirements.
- D. Finishes and Colors: Provide manufacturer's standard factory applied finish for type of system indicated. Color to be white.
- E. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung.
- F. Hanger Wire: Galvanized carbon steel wire, ASTM A 641, soft temper, pre-stretched, Class 1 coating, sized so that stress at 3-times hanger design load (ASTM C 635, Table 1, Direct Hung), will be less than yield stress of wire, but provide not less than 12 gage.
- G. Edge Moldings and Trim: Provide manufacturer's standard metal molding for edges and penetrations of ceiling which fits with type of edge detail and suspension system indicated.
- H. Hold-Down Clips for Non-Fire-Rated Ceilings: For interior ceilings composed of lay-in panels weighing less than 1 lb. per sq. ft., provide hold-down clips spaced maximum 2'-0" o.c. on all cross tees.
- I. Compression Strut/Hold Down: Provide and install compression strut to prevent vertical displacement from an upward force equal to 1 pound per square foot in conformance with the California Building Code (CBC).

### 2.3 MISCELLANEOUS MATERIALS:

- A. Acoustical Sealant: Resilient, non-staining, non-shrinking, non-hardening, non-skinning, non-drying, non-sag sealant intended for interior sealing of concealed construction joints, per requirements specified in Section 07901 "Joint Sealants".

## PART 3 EXECUTION

### 3.1 PREPARATION:

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width panels at borders wherever possible, and comply with reflected ceiling plans.
- C. Coordinate ceiling system with wall & partitions, ceiling height partitions and partition diagonal bracing & supports. Cut & adjust panels as required to allow installation of wall & partitions.

### 3.2 INSTALLATION:

- A. General:
  - 1. Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire-resistance rating requirements as indicated, and CISCA standards applicable to work.
  - 2. Any ceiling work done in areas that all above ceiling work is not completed is the responsibility of the ceiling contractor as ceiling heights listed in the room finish schedule are subject to change  $\pm$  a few inches due to clearance from above ceiling equipment and associated parts and supplies.
    - a) It is the responsibility of the ceiling contractor to get prior approval in writing from the Project Superintendent and/or Project Manger prior to installing any acoustical ceiling.
- B. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members. Locate hangers not less than 8" from each end and spaced 4'-0" along each direct-hung main runner, and as otherwise indicated, leveling to tolerance of 1/8" in 12'-0".
  - 1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
  - 2. Secure Splay Wires by looping and wire-tying, either directly to structures or to inserts, eye-screws, or other devices which are secure and appropriate for substrate, and which will not deteriorate or fail with age or elevated temperatures.
- C. Install edge moldings of type indicated at perimeter of acoustical ceiling area and at locations where necessary to conceal edges of acoustical panels. Provide continuous bead of acoustical sealant at back side edge moldings so that sealant is concealed in final installation.
- D. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
  - 1. Install hold-down clips in areas where required by governing regulations; space as recommended by panel manufacturer, unless otherwise indicated or required.

### 3.3 FIELD QUALITY CONTROL

- A. The acoustical panel ceiling installation and the in place materials will not be acceptable if any of the following conditions exist. Determination of their acceptability shall be solely based upon the Owner's Representative's judgment.
  - 1. Visible variation in color, pattern, texture or appearance.
  - 2. Panels and ceiling systems which are not installed level and plumb.
  - 3. Blemishes or defects in the material or finish of system components.
- B. Any areas or items which are not acceptable to the Owner's Representative shall be repaired at no additional expense to the Owner.

3.4 CLEANING:

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage to satisfaction of the Owner's Representative, at no cost to the Owner.

END OF SECTION 09511

## SECTION 09651

## RESILIENT BASE AND ACCESSORIES

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Resilient base.
  - 2. Resilient stair accessories.
  - 3. Resilient molding accessories.

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches (300 mm) long, of each resilient product color, texture, and pattern required.

## 1.3 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive resilient products.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

## 2.1 RESILIENT BASE

- A. Resilient Base:
  - 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. Allstate Rubber Corp.; Stoler Industries.
    - b. Armstrong World Industries, Inc.
    - c. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - d. Endura Rubber Flooring; Division of Burke Industries, Inc.
    - e. Estrie Products International; American Biltrite (Canada) Ltd.
    - f. Flexco, Inc.
    - g. Johnsonite.
    - h. Mondo Rubber International, Inc.
    - i. Musson, R. C. Rubber Co.
    - j. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
    - k. PRF USA, Inc.
    - l. Roppe Corporation, USA.
    - m. VPI, LLC; Floor Products Division.
    - n. Approved Equal.
- B. Resilient Base Standard: ASTM F 1861.
  - 1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic).
  - 2. Manufacturing Method: Group I (solid, homogeneous).
  - 3. Style: Cove (base with toe).
- C. Minimum Thickness: 0.125 inch (3.2 mm).
- D. Height: 4 inches (102 mm).
- E. Lengths: Coils in manufacturer's standard length]
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Finish: As selected by Owners Representative from manufacturer's full range].
- I. Colors and Patterns: As selected by Owners Representative from full range of industry colors].

## 2.2 RESILIENT STAIR ACCESSORIES

## A. Resilient Stair Treads:

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. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
  - b. Endura Rubber Flooring; Division of Burke Industries, Inc.
  - c. Estrie Products International; American Biltrite (Canada) Ltd.
  - d. Flexco, Inc.
  - e. Johnsonite.
  - f. Mondo Rubber International, Inc.
  - g. Musson, R. C. Rubber Co.
  - h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
  - i. PRF USA, Inc.
  - j. R.C.A. Rubber Company (The).
  - k. Roppe Corporation, USA.
  - l. VPI, LLC; Floor Products Division.
  - m. Approved equal.
- B. Resilient Stair Treads Standard: ASTM F 2169.
  1. Material Requirement: Type TS (rubber, vulcanized thermoset) or Type TP (rubber, thermoplastic)
  2. Surface Design:
    - a. Class 2, Pattern: Raised-diamond design.
  3. Manufacturing Method: Group 2, tread with contrasting color for the visually impaired.
- C. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees
- D. Nosing Height: 1-1/2 inches (38 mm)
- E. Thickness: 1/4 inch (6 mm) and tapered to back edge.
- F. Size: Lengths and depths to fit each stair tread in one piece.
- G. Risers: Smooth, flat, coved-toe, 7 inches (178 mm) high by length matching treads produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
  1. Thickness: 0.125 inch (3.2 mm).
- H. Stringers: Of same thickness as risers, height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- I. Colors and Patterns: As selected by Owners Representative from full range of industry colors.

## 2.3 RESILIENT MOLDING ACCESSORY

## A. Resilient Molding Accessory:

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. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
  - b. Flexco, Inc.
  - c. Johnsonite.
  - d. R.C.A. Rubber Company (The).
  - e. Roppe Corporation, USA.
  - f. VPI, LLC; Floor Products Division.
  - g. Approved Equal.
- B. Description: Nosing for carpet, Nosing for resilient floor covering, Reducer strip for resilient floor covering, Joiner for tile and carpet and Transition strips
- C. Material: Rubber.
- D. Profile and Dimensions: As indicated, or if not indicated, as directed by Owners Representative.
- E. Colors and Patterns: As selected by Owners Representative from full range of industry colors.

## 2.4 INSTALLATION MATERIALS

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

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - a. Cove Base Adhesives: Not more than 50 g/L.
  - b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
- D. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
- E. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
  4. Moisture Testing: Perform tests recommended by manufacturer[ and as follows]. Proceed with installation only after substrates pass testing.
    - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until they are same temperature as the space where they are to be installed.
  1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.2 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.

### 3.3 RESILIENT ACCESSORY INSTALLATION

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

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.

1. Apply one coat(s).
- C. Cover resilient products until Substantial Completion.

END OF SECTION 09651



## SECTION 09681

## SHEET CARPETING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes carpet and carpet cushion

## 1.2 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show the following:
  - 1. Carpet type, color, and dye lot.
  - 2. Seam locations.
  - 3. Pattern type, repeat size, location, direction, and starting point.
  - 4. Pile direction.
  - 5. Insets and borders.
  - 6. Edge, transition, and other accessory strips.
  - 7. Transition details to other flooring materials.
  - 8. Carpet cushion.
- C. Samples: For each color and texture required.
  - 1. Carpet: 12-inch- (300-mm-) square Sample.
  - 2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- (300-mm-) long Samples.
  - 3. Carpet Cushion: 6-inch- (150-mm-) square Sample.
- D. Product Schedule: For carpet and carpet cushion. Use same designations indicated on Drawings.
- E. Maintenance data.

## 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Mockups: Before installing carpet, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

## 1.5 WARRANTY

- A. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
  - 1. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Warranty for Carpet Cushion: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period. Failure includes, but is not limited to, permanent indentation or compression.
  - 1. Warranty Period: 10 years from date of Substantial Completion.

## 1.6 EXTRA MATERIALS

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

## PART 2 - PRODUCTS

## 2.1 WOVEN CARPET

- A. Floor carpet shall be minimum 28 oz. 100% solution dyed nylon, tufted loop pile graphic, 1/10 gage, 10 stitches per inch, unitary back. Mohawk 'Endeavor' or other approved equal. Color and pattern as selected by Owner.
- B. Applied Soil-Resistance Treatment: Manufacturer's standard material
- C. Performance Characteristics: As follows:
  - 1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm
  - 2. Dry Breaking Strength: Not less than 100 lbf (445 N) per ASTM D 2646.
  - 3. Resistance to Insects: Comply with AATCC 24.
  - 4. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
  - 5. Colorfastness to Light: Not less than 4 after 40AFU (AATCC fading units) per AATCC 16, Option E.
  - 6. Electrostatic Propensity: Less than 2 kV per AATCC 134.
  - 7. Environmental Requirements: Provide carpet that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

## 2.2 CARPET CUSHION

- A. Traffic Classification: CCC Class III, extra-heavy traffic.
- B. Performance Characteristics: As follows:
  - 1. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm].
  - 2. Environmental Requirements: Provide carpet cushion that complies with testing and product requirements of Carpet and Rug Institute's "Green Label" program.

## 2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet cushion manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
  - 1. VOC Limits: Provide adhesives with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
- C. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with CRI 104, Section 12.2.
- D. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Comply with CRI 104 and carpet and carpet cushion manufacturers' written installation instructions for the following:
  - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
  - 2. Double-Glue-Down Installation: Comply with CRI 104, Section 10, "Double Glue-Down Installation."
  - 3. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 11, "Attached-Cushion Installations."
  - 4. Preapplied Adhesive Installation: Comply with CRI 104, Section 11.4, "Pre-Applied Adhesive Systems (Peel and Stick)."
  - 5. Hook-and-Loop Installation: Comply with CRI 104, Section 11.5, "Hook and Loop Technology."
  - 6. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installation."
  - 7. Stair Installation: Comply with CRI 104, Section 13, "Carpet on Stairs" for glue-down installation.
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- D. Install pattern parallel to walls and borders.

END OF SECTION 09681



## SECTION 09911

## EXTERIOR PAINTING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
  - 1. Concrete.
  - 2. Steel.
  - 3. Galvanized metal.
  - 4. Aluminum (not anodized or otherwise coated).

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

## 1.3 QUALITY ASSURANCE

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

## 1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

## PART 2 - PRODUCTS

## 2.1 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As selected by Owners Representative from manufacturer's full range.

## 2.2 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler: MPI #4.
  - 1. VOC Content: E Range of E3.

## 2.3 PRIMERS/SEALERS

- A. Bonding Primer (Water Based): MPI #17.
  - 1. VOC Content: E Range of E3.
- B. Bonding Primer (Solvent Based): MPI #69.
  - 1. VOC Content: E Range of E3.

## 2.4 METAL PRIMERS

- A. Cementitious Galvanized-Metal Primer: MPI #26.
  - 1. VOC Content: E Range of E1.

- B. Waterborne Galvanized-Metal Primer: MPI #134.
    - 1. VOC Content: E Range of E3.
  - C. Quick-Drying Primer for Aluminum: MPI #95.
    - 1. VOC Content: E Range of E3.
- 2.5 EXTERIOR LATEX PAINTS
- A. Exterior Latex (Flat): MPI #10 (Gloss Level 1).
    - 1. VOC Content: E Range of E3.
  - B. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
    - 1. VOC Content: E Range of E3.
  - C. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
    - 1. VOC Content: E Range of E3
- 2.6 ALUMINUM PAINT
- A. Aluminum Paint: MPI #1.
    - 1. VOC Content: E Range of E3.
- 2.7 FLOOR COATINGS
- A. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.
    - 1. VOC Content: E Range of E3.
  - B. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
    - 1. VOC Content: E Range of E2.
  - C. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).
    - 1. VOC Content: E Range of E3.

### PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
  - B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
    - 1. Masonry (Clay and CMU): 12 percent.
    - 2. Wood: 15 percent.
    - 3. Plaster: 12 percent.
    - 4. Gypsum Board: 12 percent.
  - C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
  - D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
    - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- 3.2 PREPARATION AND APPLICATION
- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
  - B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
    - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
  - C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - D. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Owners Representative, and leave in an undamaged condition.
  - E. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- 3.3 EXTERIOR PAINTING SCHEDULE
- A. Concrete Substrates, Nontraffic Surfaces:
    - 1. Latex System: MPI EXT 3.1A.

- a. Prime Coat: Exterior latex matching topcoat.
  - b. Intermediate Coat: Exterior latex matching topcoat.
  - c. Topcoat: Exterior latex (semigloss).
- B. Concrete Substrates, Traffic Surfaces:
- 1. Latex Floor Paint System: MPI EXT 3.2A.
    - a. Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
    - b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
    - c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).
  - 2. Clear Sealer System: MPI EXT 3.2G.
    - a. Prime Coat: Interior/exterior clear concrete floor sealer (solvent based).
    - b. Intermediate Coat: Interior/exterior clear concrete floor sealer (solvent based).
    - c. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).
  - 3. Water-Based Clear Sealer System: MPI EXT 3.2H.
    - a. Prime Coat: Interior/exterior clear concrete floor sealer (water based).
    - b. Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
    - c. Topcoat: Interior/exterior clear concrete floor sealer (water based).
- C. Steel Substrates:
- 1. Quick-Drying Enamel System: MPI EXT 5.1A.
    - a. Prime Coat: Quick-drying alkyd metal primer.
    - b. Intermediate Coat: Quick-drying enamel matching topcoat.
    - c. Topcoat: Quick-drying enamel semigloss).
  - 2. Aluminum Paint System: MPI EXT 5.1K.
    - a. Prime Coat: Alkyd anticorrosive metal primer.
    - b. Intermediate Coat: Aluminum paint.
    - c. Topcoat: Aluminum paint.
- D. Galvanized-Metal Substrates:
- 1. Latex System: MPI EXT 5.3A.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Exterior latex matching topcoat.
    - c. Topcoat: Exterior latex (semigloss).
- E. Aluminum Substrates:
- 1. Latex System: MPI EXT 5.4H.
    - a. Prime Coat: Quick-drying primer for aluminum.
    - b. Intermediate Coat: Exterior latex matching topcoat.
    - c. Topcoat: Exterior latex (semigloss).

END OF SECTION 09911





## SECTION 09912

## INTERIOR PAINTING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Concrete.
  - 2. Steel.
  - 3. Galvanized metal.
  - 4. Aluminum (not anodized or otherwise coated).
  - 5. Wood.
  - 6. Gypsum board.

## 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples: For each finish and for each color and texture required.
- C. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

## 1.3 QUALITY ASSURANCE

- A. MPI Standards:
  - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
  - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

## 1.4 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

## PART 2 - PRODUCTS

## 2.1 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
  - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
  - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
  - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  - 4. Floor Coatings: VOC not more than 100 g/L.
  - 5. Shellacs, Clear: VOC not more than 730 g/L.
  - 6. Shellacs, Pigmented: VOC not more than 550 g/L.
  - 7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
  - 8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
  - 9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
  - 10. Floor Coatings: VOC not more than 100 g/L.
  - 11. Shellacs, Clear: VOC not more than 730 g/L.

12. Shellacs, Pigmented: VOC not more than 550 g/L.
  13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
  14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
  15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
  16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
  2. Restricted Components: Paints and coatings shall not contain any of the following:
    - a. Acrolein.
    - b. Acrylonitrile.
    - c. Antimony.
    - d. Benzene.
    - e. Butyl benzyl phthalate.
    - f. Cadmium.
    - g. Di (2-ethylhexyl) phthalate.
    - h. Di-n-butyl phthalate.
    - i. Di-n-octylphthalate.
    - j. 1,2-dichlorobenzene.
    - k. Diethyl phthalate.
    - l. Dimethyl phthalate.
    - m. Ethylbenzene.
    - n. Formaldehyde.
    - o. Hexavalent chromium.
    - p. Isophorone.
    - q. Lead.
    - r. Mercury.
    - s. Methyl ethyl ketone.
    - t. Methyl isobutyl ketone.
    - u. Methylene chloride.
    - v. Naphthalene.
    - w. Toluene (methylbenzene).
    - x. 1,1,1-trichloroethane.
    - y. Vinyl chloride.
- D. Colors: As selected by Owners representative from manufacturer's full range
- 2.2 BLOCK FILLERS
- A. Interior/Exterior Latex Block Filler: MPI #4.
1. VOC Content: E Range of E3.
- 2.3 PRIMERS/SEALERS
- A. Interior Latex Primer/Sealer: MPI #50.
1. VOC Content: E Range of E3.
- 2.4 METAL PRIMERS
- A. Alkyd Anticorrosive Metal Primer: MPI #79.
1. VOC Content: E Range of E2]
- B. Quick-Drying Alkyd Metal Primer: MPI #76.
1. VOC Content: E Range of E3.
- C. Waterborne Galvanized-Metal Primer: MPI #134.
1. VOC Content: E Range of E3.
- D. Vinyl Wash Primer: MPI #80.
1. VOC Content: E Range of E3]
- E. Quick-Drying Primer for Aluminum: MPI #95.

1. VOC Content: E Range of E3.
- 2.5 WOOD PRIMERS
- A. Interior Latex-Based Wood Primer: MPI #39.
    1. VOC Content: E Range of E3.
- 2.6 LATEX PAINTS
- A. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
    1. VOC Content: E Range of E3.
- 2.7 QUICK-DRYING ENAMELS
- A. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
    1. VOC Content: E Range of E3
- 2.8 ALUMINUM PAINT
- A. Aluminum Paint: MPI #1.
    1. VOC Content: E Range of E3.
- 2.9 FLOOR COATINGS
- A. Interior Concrete Floor Stain: MPI #58.
    1. VOC Content: E Range of E3.
  - B. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.
    1. VOC Content: E Range of E3.
  - C. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
    1. VOC Content: E Range of E2.

### PART 3 - EXECUTION

- 3.1 EXAMINATION
- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
  - B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
    1. Concrete: 12 percent.
    2. Masonry (Clay and CMU): 12 percent.
    3. Wood: 15 percent.
    4. Gypsum Board: 12 percent.
    5. Plaster: 12 percent.
  - C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
  - D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
    1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- 3.2 PREPARATION AND APPLICATION
- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
  - B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
    1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
  - C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
  - D. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
    1. Mechanical Work:
      - a. Uninsulated metal piping.
      - b. Uninsulated plastic piping.
      - c. Pipe hangers and supports.

- d. Tanks that do not have factory-applied final finishes.
  - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
  - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
- E. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Owners Representative, and leave in an undamaged condition.
- F. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

### 3.3 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Traffic Surfaces:
1. Latex Floor Enamel System: MPI INT 3.2A.
    - a. Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
    - b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
    - c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).
  2. Concrete Stain System: MPI INT 3.2E.
    - a. First Coat: Interior concrete floor stain.
    - b. Topcoat: Interior concrete floor stain.
  3. Clear Sealer System: MPI INT 3.2F.
    - a. First Coat: Interior/exterior clear concrete floor sealer (solvent based).
    - b. Topcoat: Interior/exterior clear concrete floor sealer (solvent based).
  4. Water-Based Clear Sealer System: MPI INT 3.2G.
    - a. First Coat: Interior/exterior clear concrete floor sealer (water based).
    - b. Topcoat: Interior/exterior clear concrete floor sealer (water based).
- B. Steel Substrates:
1. Quick-Drying Enamel System: MPI INT 5.1A.
    - a. Prime Coat: Quick-drying alkyd metal primer.
    - b. Intermediate Coat: Quick-drying enamel matching topcoat.
    - c. Topcoat: Quick-drying enamel (semigloss).
  2. Aluminum Paint System: MPI INT 5.1M.
    - a. Prime Coat: Alkyd anticorrosive metal primer.
- C. Galvanized-Metal Substrates:
1. Water-Based Dry-Fall System: MPI INT 5.3H.
    - a. Prime Coat: Waterborne dry fall.
    - b. Topcoat: Waterborne dry fall.
  2. Latex System: MPI INT 5.3A.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss)
  3. Latex Over Waterborne Primer System: MPI INT 5.3J.
    - a. Prime Coat: Waterborne galvanized-metal primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss).
  4. Aluminum Paint System: MPI INT 5.3G.
    - a. Prime Coat: Cementitious galvanized-metal primer.
    - b. Intermediate Coat: Aluminum paint.
    - c. Topcoat: Aluminum paint.
- D. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Latex System: MPI INT 5.4H.
    - a. Prime Coat: Quick-drying primer for aluminum.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss)
  2. Aluminum Paint System: MPI INT 5.4D.
    - a. Prime Coat: Vinyl wash primer.
    - b. Intermediate Coat: Aluminum paint.

- c. Topcoat: Aluminum paint.
- E. Dressed Lumber Substrates: Including architectural woodwork and doors
- 1. Latex System: MPI INT 6.3T.
    - a. Prime Coat: Interior latex-based wood primer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss).
  - 2. Latex Over Alkyd Primer System: MPI INT 6.3U.
    - a. Prime Coat: Interior alkyd primer/sealer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss).
- F. Wood Substrates, Traffic Surfaces:
- 1. Latex Floor Paint System: MPI INT 6.5G.
    - a. Prime Coat: Interior alkyd primer/sealer.
    - b. Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
    - c. Topcoat: Interior/exterior latex floor and porch paint (low gloss).
- G. Gypsum Board Substrates:
- 1. Latex System: MPI INT 9.2A.
    - a. Prime Coat: Interior latex primer/sealer.
    - b. Intermediate Coat: Interior latex matching topcoat.
    - c. Topcoat: Interior latex (semigloss).

END OF SECTION 09912



**DIVISION 10**

**SPECIALTIES**

10005

Miscellaneous Specialties

10005-1 to 2

10155

Toilet Compartments

10155-1 to 2

10800

Toilet Accessories

10800-1





## SECTION 10005

## MISCELLANEOUS SPECIALTIES

## PART 1 GENERAL

- 1.1 SCOPE: Provide miscellaneous specialties, complete.
- 1.2 SUBMITTALS: Comply with Section 01300. Submit installation instructions for each specialty item.
- A. Product Data: Submit manufacturer's technical data and installation instructions for accessory item specified.
  - B. Shop Drawings: Submit shop drawings indicating location, details of installation, finishes, and other pertinent data.
  - C. Samples: Submit samples of full color line for Architect's selection for materials, fabrics, and other items specified.
  - D. Signage: Submit one sample illustrating methods of raised symbols and copy as required per ADAAG and ANSI 117.1 - 1986. Submit shop drawings showing sign sizes, copy, symbols, letterform and letter heights.

## PART 2 PRODUCTS

- 2.1 FIRE EXTINGUISHER AND CABINET:
- A. Cabinet: Steel cabinet for semi-recessed installation. Provide cabinet with door with plexi-glass window. Provide in manufacturer's standard white color.
  - B. Extinguisher:
    - 1. "ABC" Type, 10 lb. heavy duty steel extinguisher, with semi-recessed cabinet. See plans for locations
- 2.2 SIGNAGE
- A. Provide signage for locations as shown on the drawings and as specified herein.
    - 1. Provide Toilet Room signage as manufactured by or equal to Mohawk Sign Systems Series 200A: Sand-Carved. Signs shall comply with ADAAG (Americans with Disabilities Act Guidelines) and ANSI (American National Standards Institute) 117.1. Raised Tactile Grade 2 Braille shall be integral with the sign face and shall be raised 1/32".
      - a) Toilet Room Identification signs: At each handicap accessible toilet room, provide one sign (8" x 8") with either "MEN", "WOMEN" or "RESTROOM" (for uni-sex) as indicated by room use. Each sign shall have 4" accessibility symbol, gender symbol and copy below followed by Grade 2 Braille
    - 2. Exterior handicap parking signs shall be R7-8 Signs, 12" x 18" shall comply with ADAAG (Americans with Disabilities Act Guidelines) and ANSI (American National Standards Institute)
      - a) Accessible Parking: At each accessible parking space, provide one sign (12" x 18" reflective) with accessibility symbol and either "PARKING" or "VAN ACCESSIBLE" (where indicated on drawings). Mount at 54" above finish grade on galvanized steel U-channel posts.
    - 3. All other signage by owner
  - B. Character Proportion: Letters and numbers on signs shall have a width-to-height ratio of between 3:5 and 1:1 and a stroke to width-to-height ratio between 1:5 and 1:10.
  - C. Color Contrast: Characters and symbols shall contrast with their background - either light characters on a dark background or dark characters on a light background.
  - D. Raised or Indented Characters or Symbols: Letters and numbers on signs shall be raised or incised 1/32" minimum and shall be sans serif font. Raised characters or symbols shall be at least 5/8" high, but no higher than 2". Indented characters or symbols shall have a stroke width of at least 1/4". Symbols or pictographs on signs shall be raised or indented 1/32" minimum.
  - E. Symbols of Accessibility: All accessible facilities required to be identified shall use the international symbol of accessibility.

- F. Mounting Height and Location: Interior signage shall be located alongside the door on the latch side and shall be mounted at a height of between 54" and 66" above finish floor.
- G. Mounting: Signs shall be mounted using vinyl tape for interior signs and concealed holes and screws for exterior frame signs. Interior signs shall be mounted on wall with center at 60" above finish floor on the latch side of door and approximately 2" from door frame. Provide any and all accessories necessary for mounting of signs including vinyl tape, screws/fasteners, posts or standoff channels in order to securely and permanently mount signs as directed by Architect.

### PART 3 EXECUTION

#### 3.1 EXAMINATION AND PREPARATION

- A. Verify that surfaces and internal wall blocking are ready to receive work and opening dimensions are as indicated on shop drawings or as instructed by the manufacturer.

#### 3.2 INSTALLATION

- A. Install each accessory in compliance with manufacturer's instruction and final shop drawings.
- B. Install at locations and mounting heights indicated or as directed by Architect.
- C. Secure units level and plumb.

END OF SECTION 10005

## SECTION 10155

## TOILET COMPARTMENTS

## PART 1 GENERAL

1.1 SCOPE: Provide toilet compartments, complete, including urinal screens and shower compartments.

1.2 SUBMITTALS: Comply with Section 01300

- A. Product Submit manufacturer's detailed technical data for materials, fabrication, and installation.
- B. Shop Drawings: Submit shop drawings for the fabrication and erection of toilet compartment assemblies not fully described by manufacturer's data. Show all anchorages, thicknesses of panels, hardware, fittings and fastenings. Submit setting drawings, templates and instructions for the installation of anchorage devices built into other work.
- C. Samples: Submit full range of color samples for Architect's selection.

## PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Accurate Partitions Corporation
- B. American Sanitary Partition Corporation
- C. Bobrick Washroom Equipment, Inc.
- D. Flush-Metal Partition Corporation
- E. General Partitions Manufacturing Corporation
- F. Global Steel Products Corporation
- G. Knickerbocker Partition Corporation
- H. Sanymetal Products

2.2 TYPE: Flush construction floor mounted overhead braced type partitions and compartments and wall hung urinal screens.

- A. Door, Panel and Pilaster construction: Sheet steel ASTM A653/A653M formed with reinforced core, baked enamel finish, in standard color as selected by the Architect.
- B. Doors and Panels thickness: 1 inch.
- C. Pilasters thickness: 1-1/4 inches.

2.3 ACCESSORIES

- A. Head Rails: Hollow chrome-plated steel or aluminum tube with anti-grip profile and cast socket wall brackets.
- B. Pilaster Shoes: Formed chrome-plated steel. Provide adjustment for height variations with screw jack through steel saddles.
- C. Internal reinforcement: Provide for attached hardware and fittings.
- D. Attachments and Bolts: Steel with heavy-duty aluminum brackets.
- E. Hardware:
  - 1. Hinges: Pivot hinges, gravity type, adjustable; two per door.
  - 2. Latch and Keeper: Sliding type latch, door strike and keeper with rubber bumper; for each door.
  - 3. Coat hook: Cast alloy with rubber bumper tip; mounted on door panel.
  - 4. Pull: Provide pull handle for out-swinging door panels.

## PART 3 EXECUTION

3.1 EXAMINATION

- A. Field verify that opening dimensions and plumbing fixture and rough-in locations are as shown on the drawings.
- B. Verify correct location of all built-in framing, anchorage, bracing and blocking.

### 3.2 INSTALLATION

- A. Install partitions and screens rigid, straight, plumb and level, in strict accordance with manufacturer's instructions and final shop drawings.
- B. Secure panels in position with manufacturer's recommended anchoring devices.
- C. Secure pilaster to floor and level, plumb and tighten installation with devices furnished. Hang doors and adjust so that tops of doors are parallel with overhead-brace when doors are in closed position.
- D. Provide 3/8" to 1/2" clearance between walls and panels and between walls and end pilasters.
- E. Ensure that the finish floor and plumbing fixtures are installed prior to installation of partitions.

### 3.3 ADJUST AND CLEAN

- A. Adjust and lubricate hardware for free movement and proper operation. Set hinges on in-swinging doors to hold open approximately 30 degrees from closed position when unlatched. Set hinges of out-swinging doors to return to fully closed position.
- B. Clean exposed surfaces of partition systems using materials and methods recommended by manufacturer, and provide protection as necessary to prevent damage during remainder of construction period.

END OF SECTION 10155

## SECTION 10800

## TOILET ACCESSORIES

## PART 1 GENERAL

- 1.1 SCOPE: Provide toilet accessories, complete, for toilet rooms.
- 1.2 SUBMITTALS: Comply with Section 01300
- A. Product Data: Submit technical data and installation instructions for each toilet accessory.
  - B. Shop drawings: Submit shop drawings showing grab bar installation. Provide setting drawings, instructions and directions for installation of anchorage devices in other work.
- 1.3 JOB CONDITIONS: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units. Provide proper backing or blocking within walls for adequate structural support and anchorage of all accessories.

## PART 2 PRODUCTS

- 2.1 MANUFACTURERS: Bobrick, Bradley, or ASI.
- 2.2 MATERIALS
- A. Stainless Steel: ANSI Type 302/304, No. 4 finish, 22 gage minimum or ABC Plastic.
  - B. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.
- 2.3 ACCESSORIES
- A. Paper Towel Dispensers shall be equal to Bobrick Model B-262.
  - B. Soap Dispensers shall be equal to Bobrick Model B-40.
  - B. Grab Bars: Bobrick B-6106.99 Series, Bradley 812-2 Series, or ASI 3200-P, shapes and sizes as indicated.
    - 1. Strongly secure fastenings to wood backing or by other accepted methods to withstand contemplated stresses.
  - C. Toilet Paper Dispenser, Surface Mounted, (2) roll tissue dispenser equal to Bobrick Model B-2740
  - D. Mirrors: Provided for in Section 08800, GLASS & GLAZING

## PART 3 EXECUTION

- 3.1 INSTALLATION
- A. Install toilet accessory units in accordance with manufacturer's instructions, using fasteners which are appropriate to substrate and recommended by manufacturer of unit.
  - B. At grab bars strongly secure fastenings to steel backing plate or by other accepted methods.
  - C. Install units plumb and level, firmly anchored in location and at heights indicated or directed by Architect.

END OF SECTION 10800



**DIVISION 13      SPECIAL CONSTRUCTION**

**13321              Metal Building Systems**

**13321-1 to 7**





## SECTION 13321

## PRE-ENGINEERED STEEL BUILDING SYSTEM

## PART 1 GENERAL

- 1.1 SECTION INCLUDES: Pre-engineered steel building system, complete with structural framing (columns, rafters, struts, purlins, girts); prefinished roofing, siding; roof and wall insulation; metal flashings; trim; gutters and downspouts; diagonal bracing; fasteners; roof and wall accessories and other components and material required for a complete installation.
- 1.2 RELATED WORK SPECIFIED IN OTHER SECTIONS
- A. Structural Steel: Section 05120
  - B. Building Insulation: Section 07210 and Section 7211
  - C. Metal Doors and Frames: Section 08111
- 1.3 DESCRIPTION
- A. Building Type: Clear span double slope rigid frame with uniform depth (straight) columns and tapered rafter sections (as shown on drawings) made of shop welded steel plates.
  - B. Roof Slope: As shown on drawings.
  - C. Column Spacing at Exterior Walls: As shown on drawings and compatible with placement of openings shown on drawings and any other requirements.
  - D. Eave Height: As shown on drawings, measured vertically from top of eave strut at sidewall steel line to base of sidewall frame column. Any minimum vertical clearance from finish floor to underneath the rigid frame rafters at the sidewalls or otherwise shall be as shown on drawings.
- 1.4 QUALITY ASSURANCE
- A. For the structural design and manufacture of the steel building system, use the following codes and Standards throughout:
    - 1. AWS D1.1 "Structural Welding Code-Steel."
    - 2. MBMA "Low-Rise Building Systems Manual," latest edition and supplements.
    - 3. AISI "Specifications for the Design of Cold Formed Steel Structural Members," latest edition.
    - 4. AISC "Steel Construction Manual" and "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings."
    - 5. AISC "Specification for Structural Joints Using ASTM A325 or ASTM A490 bolts."
    - 6. Applicable portions of the Structural Steel Painting Council (SSPC) Standards, as referenced herein.
    - 7. American Society for Testing and Materials (ASTM), Standards as referenced herein.
  - B. The steel building system manufacturer shall be certified in accordance with American Institute of Steel Construction (AISC) quality certification program category MB for metal buildings. This certification is to cover areas of general management, engineering and drafting, procurement, operations and quality control. The manufacturer shall provide proof of certification.
  - C. All structural building design shall be in compliance with the Building Code and regulations of any other governing authorities having jurisdiction at project site as shown on the drawings.
  - D. Design Loads:
    - 1. Basic design loads, as well as auxiliary and collateral loads are indicated on the drawings.
    - 2. Basic design loads include live load, wind load, seismic load in addition to the dead load.
    - 3. Collateral loads include additional dead loads over and above the weight of the metal building system including but not limited to sprinkler systems, suspended ceiling systems, mechanical systems and roof top walkway/access systems.
      - a. See drawings for requirements of all collateral loads.
    - 4. Design each member to withstand stresses resulting from combinations of loads that produce allowable stresses in that member, as prescribed in MBMA's "Design Practices Manual".
- 1.5 SUBMITTALS

- A. General: Comply with Section 01300.
- B. Shop Drawings and Calculations:
  - 1. Design Calculations and Erection Drawings: Prepared by, or under direct supervision of, Registered Professional Engineer, licensed to practice in the state where the project is to be constructed and with all drawings and calculations bearing his seal.
  - 2. Show each type structural building frame required and their locations within structure; details of anchor bolt settings; sidewall, end wall, and roof framing; diagonal bracing and location within structure; metal floor deck and joist types; wall and roof insulation and types; longitudinal and transverse cross sections; details of curbs, roof jacks, and items penetrating roof; canopy framing and details; trim, gutters, downspouts, liner panels, wall and roof coverings, and all accessory items; materials; finishes; construction and installation details; and other pertinent information required for proper and complete fabrication, assembly and erection of watertight building system.
- C. Material and Color Samples:
  - 1. For each specific material sample requested by Engineer, submit in size, form, and number directed.
  - 2. Submit duplicate color sample sets showing full color range available, for selection purposes.
- D. Product Data: Two (2) copies of manufacturer's specifications and descriptive literature.
- E. Certification: Two (2) copies of written certification, prepared and signed by Registered Professional Engineer licensed to practice in the state where the project is to be constructed, attesting that the building design submitted meets all specified loading requirements, requirements of codes and authorities having jurisdiction at the project site, and any other requirements specified by this document.
- F. Steel building system manufacturer shall submit to the Architect, certification that the design is by an approved manufacturer and that the roof system shall qualify for UL Class 90 and state construction number.

#### 1.6 PRODUCT HANDLING, DELIVERY AND STORAGE

- A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed.
- B. Stack materials on platforms or pallets above grade or on concrete slab, covered with opaque tarpaulins or other approved weather-resistant ventilated covering.
- C. Store metal sheets and panels if subjected to water accumulation in such a manner so they will drain freely. Do not store sheets and panels in contact with other materials which might cause staining.
- D. Damaged material shall be reported to the steel building system manufacturer and the Architect to determine if replacement is required.
- E. Inspect panels to prevent moisture between panels, and secure as required.

#### 1.7 WARRANTIES

- A. All Components: Standard one (1) year workmanship warranty.
- B. Roof Panels including any Canopy Roof Panels: Twenty (20) year paint finish warranty, twenty (20) year no-perforation warranty.
- C. Wall Panels: Twenty (20) year paint finish warranty.
- D. Roof and wall panels with full 70% polyvinylidene fluoride (Kynar) finish: Twenty (20) year warranty covering color fade in addition to that described above.
- E. All roof and wall panels shall have twenty (20) year film integrity warranty in addition to that described above against any peeling, cracking, blistering, etc. of the paint finish.

### PART 2 PRODUCTS

- 2.1 MANUFACTURERS: The metal building system shall be as manufactured by one of the following.
  - A. Schulte Building Systems (SBS)
  - B. Whirlwind Building Componets
  - C. Alliance Steel Building Systems
  - D. American Building Co.
  - E. Others as approved.

## 2.2 STRUCTURAL STEEL

## A. Materials:

1. Structural Plate or Bar Stock:
2. Cold Formed Structural Steel:
3. Primary Structural Bolts and Nuts: ASTM A325.
4. Prime Coat Paint: Primer shall be SSPC 15, type 1, red alkyd primer minimum one mil thickness.

## B. Fabrication:

1. Primary Framing: Rigid frames of shop-welded steel plate columns and rafters, both tapered and uniform depth sections as required by drawings, complete with all necessary stiffeners, connection plates and holes for field-bolted assembly.
  - a) Columns and Rafters: Fabricated with holes in web and/or flanges for attachment of secondary members.
  - b) Splice Plates: Factory fabricated for precise rafter-to-rafter and/or column-to-rafter connections, complete with connection bolt holes.
  - c) Base Plates, Cap Plates, Splice Plates and stiffeners: Fabricate to sizes required, complete with all holes for connection of primary and secondary structural members. Factory weld into place.
  - d) Join flanges and webs of structural members fabricated of plate or bar stock together by continuous automatic submerged arc welding process with all welding performed under the supervision of certified welders in accordance with standard practices of AWS D1.1.
  - e) Make all primary rigid frame field-bolted connections with A325 high-strength bolts of size required by building system manufacturer.
  - f) Clean all components of oil, dirt, loose scale, and foreign matters. Factory paint with primer.
2. Endwall Framing: Cold-formed and/or shop-welded steel plate members consisting of rafters and columns fabricated for field-bolted assembly.
  - a) Columns, Rafters, Splice Plates, Clips, Angles and Channels: Factory fabricate to size required.
  - b) Plate Stock Endwall Framing Members: Join flanges and webs by continuous automatic submerged arc welding process, under the supervision of welders certified in accordance with standard practices of AWS D1.1.
  - c) Clean components of oil, dirt, loose scale and foreign matter and factory paint with primer.
3. Secondary Framing, (Purlins, Girts, Struts, Flange Braces, Base Angles, as required):
  - a) Purlins: Zee sections roll formed and pre-punched for attachment to frames.
  - b) Girts: Zee or Cee channel sections of roll formed and pre-punched for attachment to frames.
  - c) Eave Struts: Roll formed sections with vertical web to receive sidewall panels and minimum four (4) A325 bolt attachments to rigid frame in factory-punched holes in column or bracket.
  - d) Roof Struts: Provide as required, detailed and shown on final shop drawings, as required by design analysis, with attachment to top flange or rigid frame rafters by minimum two (2) 1/2" minimum size diameter bolts at each end of strut.
  - e) Flange Braces: Steel angles attached to purlin or girt, to stiffen rigid frame flanges as dictated by design and noted on final shop drawings.
  - f) Base Angle for Wall Panels: Minimum 0.071" thickness angle of commercial grade steel, for field attachment to foundation with approved type drive anchors.
  - g) Clean secondary framing components to be free from oil, dirt, loose scale and foreign matter and factory paint with primer.

## 2.3 ROOFING & SIDING

### A. Roofing and Siding Panels

1. Standing Seam Roof Panels:
  - a) Roof panels shall be standing seam type, roll-formed to provide 20" net coverage from 24-gauge steel. The panel edges shall join together to form a 2" high box rib with a 7/8" high standing seam. The seam shall be machine-closed, double lock (360 degrees) design with factory-applied sealant. The panel flats shall be embossed with cross ribs at maximum 6" o.c. to minimize oil-can and flutter. The panel ends shall be factory-notched for end splicing (when required). Panels shall be longest length possible to minimize end splices. The panels shall be secured to the structure with concealed clips designed to accommodate the roof expansion/contraction and to provide insulation stand-off as necessary. Perimeter trim, start/finish panels, ridge cover and transition flashing shall be provided and shall be designed to accommodate the roof's expansion/contraction. All Closures, sealants and fasteners shall be provided as required for a weathertight installation.
2. Wall Panels:
  - a) Wall panels shall be roll-formed to provide 36" net coverage from 26-gauge steel. The panels shall have 1-1/8" high major ribs 12" o.c. with two minor ribs symmetrically spaced between the major ribs or as shown on drawings. Panel side laps shall be formed by lapping major ribs at the panel edges. The underlapping rib shall have full bearing legs to support the side lap. Panels shall be longest length possible to minimize end laps. Panel end splices (when required) shall be over a structural member and shall be a 4" minimum lap. Corner trim, base trim and transition flashings shall be provided as required to complete the wall assembly. All Closures and fasteners shall be provided as required for a weathertight installation.
3. Panel Finishes:
  - a) Roof Panels: Aluminum-zinc alloy coating conforming to the requirements of ASTM A792. Color as selected from standard color selections.
  - b) Wall Panels: Aluminum-zinc alloy coating with color as selected from standard color selections.
4. Fasteners: Length dimension for wall/roof panel attachment screws must be as necessary to accommodate the thicknesses of the panel style and any insulation allowance for the specified type of application. All exposed fastener heads shall be factory colored to match color of the panels. All fasteners used for the project shall at a minimum be as recommended for the intended application by the steel building system manufacturer or the steel panel manufacturer.
  - a) Wall Panels: Cadmium or zinc plated minimum #12 self-drilling carbon steel screws with hex washer head. All screws shall be factory coated with a premium coating which protects against corrosion and weathering.
  - b) Roof Panels: Minimum #12 self-drilling carbon steel screws with molded zinc alloy or capped stainless steel cupped hex washer head and EPDM sealing washer.
    - 1) Exposed Fasteners for Eave, End Splice, Ridge Cover and Flashings: Minimum #14 self-drilling carbon steel screws with molded zinc alloy or capped stainless steel cupped hex washer head and EPDM sealing washer.
  - c) Roof Panel Expansion Clips: Cadmium or zinc plated minimum #12 self-drilling carbon steel screws with hex head.
  - d) Trim Fasteners: Plated and finish painted #8 self-drilling carbon steel screws with 1/4" hex washer head.
5. Roof Panel Tube Sealant: Non-skinning butyl-based sealant, Sikalastamer-511 service temperature range -60 degrees F to 220 degrees F or approved equal.

## 2.4 WIND BRACING

- A. Commercial grade steel rod, cable or portal frame bracing located as shown on the drawings which do not conflict with designed openings, etc.
  1. Steel Rod Bracing: Provide complete with necessary slope washers, flat washers and adjusting nuts at each end.

- B. Clean components free of oil, dirt, loose scale and foreign matter.
- 2.5 BUILDING INSULATION: Refer to Specifications Section 07210 Thermal Insulation and 7211 Metal Building Insulation System for further information.
- 2.6 ACCESSORIES
- A. Gutters and Downspouts
1. Gutters shall be suspended box sections fabricated of minimum 26 gauge G90 zinc-coated (galvanized) or AZ50 aluminum-zinc alloy-coated and factory-colored steel. Gutters shall be formed to match the configuration of the gable trim and shall have a minimum cross sectional area of 36 square inches. Gutters shall be attached to the roof structure as specified on the steel building system manufacturer's erection drawings. Gutter section splices shall be lapped and sealed and end closures shall be sealed with aluminized sealant and then fastened with trim fasteners.
  2. Downspouts shall be fabricated of minimum 29 gauge G90 zinc-coated (galvanized) or AZ50 aluminum-zinc alloy-coated factory-colored steel. Downspouts shall be minimum size/configuration and location as shown on the drawings or, otherwise, shall be located and sized by the steel building system manufacturer according to design requirements shown on the drawings and as specified. Downspouts shall be attached to a thimble installed in the gutter. Downspouts shall be attached to the wall panel using minimum 26 gauge galvanized factory-colored steel straps on maximum 10'-0" centers. A 75 degree elbow shall be provided at the base of all downspouts to direct the water flow away from the building.
  3. Finish: Siliconized polyester system finish in color as selected by Architect.
- B. Walk Doors, Leafs, Frames and Hardware: Refer to Section 08111 Metal Doors and Frames for further information.
1. Frames: Fabricated from minimum 14 gauge steel with G-60 galvanized coating and with minimum 5-3/4" deep frame profile. Provide complete with 18 gauge sill channel, 22 gauge adapter angles, galvanized reinforcements and preparations required for finish hardware. Provide factory-applied bronze colored rust inhibitive prime coat finish.
  2. Leafs: In size shown on drawings, not less than 1-3/4" thick, of flush panel design or as shown on drawings. Fabricate from minimum 18 gauge steel with G-60 galvanized coating. Provide complete with internal reinforcements, stiffeners, sound deadening core material, preparation required for finish hardware. Provide factory-applied bronze colored rust inhibitive prime coat finish.
  3. Finish Hardware: Provide the minimum following hardware in quantity required for operational installation of doors:
    - a) Hinges: Three standard, regular weight, full mortise type per door leaf.
    - b) Weatherstripping: Standard type for attachment to door frames.
    - c) Thresholds: Aluminum type, factory-notched at each end for tight fit to jamb frames.
    - d) Mortise Locks: Heavy duty type with dull chrome finish 26D, Government No. 86, or approved equal.
    - e) Cylinder Locks: Dull chrome finish 26D with 2-3/4" backset, Government No. 160 or approved equal.
    - f. Refer to section 08710 for more information.
- C. Roof Jacks, Pipe Flashings and Roof Curbs:
1. Roof jacks shall be minimum 26 gauge steel cone, Shell White factory installed and sealed to roof panel. Cone shall be made of same material as roof panel.
    - a) Stack or pipe penetration shall be at the centerline of a roof panel.
  2. Pipe flashing shall consist of a molded EPDM rubber cone with an aluminum ring bonded to the base. Pipe flashing shall accommodate pipe diameter as necessary and be capable of flashing penetration at any location of the roof panel. Flashing shall be sealed and fastened in accordance with manufacturer's instructions. Use "Dektite" by Buildex or other approved equal. Paint flashing and pipe same color as roof.
  3. Roof curbs shall be made of minimum 18 gauge AZ55 aluminum-zinc alloy-coated steel. Curbs shall have an integral cricket type water diverter for the upstream end. Curbs shall be minimum

8" high. All roof curbs shall be furnished by the supplier of the metal roof system and shall be factory made for the specific roof system to be used for the project.

### PART 3 EXECUTION

#### 3.1 ERECTION

##### A. General

1. Erection shall be accomplished by a trained, competent erector having experience in erecting metal buildings.
2. Install all metal building system components in strict compliance with manufacturer's instructions shown on final shop drawings.
3. Handle and store all materials to avoid damage and replace any damaged materials.
4. Erector shall observe and follow recommendations of the Metal Building Manufacturers Association (MBMA) practice and procedures where applicable.
5. Do not field cut or alter structural members without approval from steel building system manufacturer.

##### B. Structural Frames:

1. Erect true to line, level and plumb, brace and secure with temporary bracing in all directions as required.
2. Level base plates and secure to anchor bolts to level plane with full bearing to foundation supporting structures.

##### C. Bracing:

1. Install all permanent diagonal rod, cable or angle bracing in roof and sidewalls as approved by manufacturer.
2. Properly tighten rods and/or cables to avoid excessive sag.

##### D. Framed Openings:

1. Securely attach to building structural framing members, square and plumb.

##### E. Roofing and Siding Panels:

1. Roof Panels:
  - a) Install roof panels in such a manner to permit drainage to eaves of building, with panel ends perpendicular to eave line.
  - b) Install wall panels with vertical edges plumb.
  - c) Arrange and nest side lap joints away from prevailing winds when possible.
  - d) Apply panels and associated items for neat and weathertight enclosure.
  - e) Avoid "panel creep" or application not true to gridlines.
  - f) Protect factory finishes from mechanical damage or abrasions.
  - g) Install approved type closures to exclude weather.
    - 1) Install weather seal under ridge cap. Flash and seal roof panels at eave, gable and perimeter of all openings through roof and elsewhere as required or shown on drawings.
    - 2) Flash and/or seal wall panels at perimeter of all openings, under eaves and gable trims, along lower panel edges, and elsewhere as required or shown on drawings, as applicable.
  - h) Remove all fastener or cutting shavings from roof and wall as erection is completed.
2. Wall Panels:
  - a) Install wall panels on exterior side of metal framing at locations shown on drawings.
  - b) Align bottoms of panels to proper coverage and fasten with manufacturer's recommended and supplied fasteners.
  - c) Cut and fasten flashing and trims with approved type fasteners.
  - d) Install all fasteners with power tool having adequate torque and proper r.p.m. adjusted to seat fastener without damage to heads, washers or panels.
  - e) Install panel side lap away from prevailing wind or view direction when possible, maintaining proper lap without fastener dimpling or excessive overlap.

- ##### F. Accessories:
- Install gutters, downspouts, flashings, trim, ridge covers, roof curbs, pipe flashings, closure strips, roof jacks, and other accessories and sheet metal items in accordance with manufacturer's recommendations for positive attachment to building and provide a weathertight mounting.

- G. Swing Doors and Frames: Install doors and frames straight, plumb, and level. Securely anchor frames to building structure. Set units with 1/8" maximum clearance between door and frame at jambs and head, and 3/4" maximum between door leaf and floor. Adjust for proper operation.
- H. Thermal Insulation:
  - 1. Install in accordance with manufacturer's recommended procedure, performed concurrently with installation of wall and roof panels.
  - 2. Roof and Wall Insulation: Install blankets straight and true. Fasten tabs together or lap and glue to provide complete vapor barrier. Place insulation with facing exposed to interior of building unless recommended otherwise.

### 3.2 PAINTING

- A. Touch-up all abrasions, scratches, field welds or other damages in shop-primed or factory-finished painted surfaces consistent with shop primer or factory-finished painting.
- B. Apply finish paint coats to factory-primed items.
  - 1. Provide finish coats which are compatible with metal building manufacturer's prime coat paints.
  - 2. Provide approved type barrier coats over incompatible primers where required.
  - 3. Notify architect in writing of anticipated problems using specified coatings with substrates primed by others.
  - 4. All finish coats by others should be solvent base material or approved by building manufacturer.
  - 5. Protect hardware and accessories and similar items in place and not to be finish-painted.
  - 6. Finish exterior swing doors on tops, bottoms and edges same as exterior faces, unless otherwise indicated.

### 3.3 TOLERANCES

- A. All framing members shall be erected plumb, level or aligned not to exceed a deviation 1:300.

END OF SECTION





NOVEMBER 8, 2010

MECHANICAL – DIVISION 15000  
ELECTRICAL – DIVISION 16000

PROJECT MANUAL

FOR

PATHWAYS UNITED METHODIST CHURCH

NEW BUILDING

ORONOGO, MISSOURI

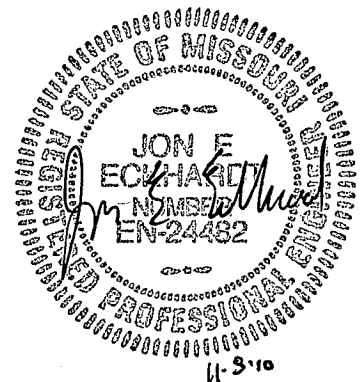
  
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STATE OF MISSOURI





**DIVISION 15**

**MECHANICAL**

15050	Basic Materials and Methods	15050-1 to 5
15400	Plumbing	15400-1 to 7
15600	Furnaces and Heat Pumps	15600-1 to 3
15880	Air Distribution	15880-1 to 4
15990	Testing, Adjusting, and Balancing	15990-1



## SECTION 15050

## BASIC MECHANICAL MATERIALS AND METHODS

## PART 1

## 1.1 SECTION INCLUDES

- A. General Conditions
- B. Supplementary Conditions
- C. Division 1
- D. Mechanical basic requirements
- E. Electric Motors
- F. Pipe, Valve, & Equipment Identification
- G. Pipe Hangers & Accessories
- H. Access Boxes & Panels Vibration Isolators
- I. Vibration Isolators
- J. Flashing & Sleeves
- K. Painting of Equipment

## 1.2 SYSTEM DESCRIPTION

- A. Provide complete and fully operational systems with facilities and services to meet requirements indicated and in accord with applicable codes and ordinances.

## 1.3 REGULATORY REQUIREMENTS

- A. Plumbing: Conform to latest International Plumbing Code (International Code Council, ICC)
- B. Obtain permits, and inspections from authority having jurisdiction.
- C. HVAC: Conform to latest International Mechanical Code (International Code Council, ICC), NFPA 90A (Air Conditioning & Ventilating Systems) and NFPA 90B (Warm Air Heating & Air Conditioning Systems).
- D. Conform to all Local, City, & State codes as well as requirements of Fire Marshall, governmental agencies and Fire Rating Bureau having jurisdiction.

## 1.4 SUBMITTALS

- A. Submit under provisions of Division 01000 (Section 01001). Submit shop drawings and product data grouped to include complete, submittals of related systems, Products, and accessories in a single submittal.
- B. Mark dimensions and values in units to match those specified.
- C. Provide (1) one onsite training session and (2) complete sets of written instructions to the owner for operation and maintenance of all fixtures and equipment used on the project.
  - 1. All fixtures and equipment must be operational before onsite training takes place.
- D. Provide a set digital pictures on a CD for the owners record of all under-slab and in wall work after inspection by the building inspector having jurisdiction over the project and before backfill and/or wall materials are installed.(applies to all work hidden and unable to view at projects completion)
  - 1. Supply pictures of the type and minimum quality listed below.
    - a. JPEG image, 5 mega pixel or better set to the largest format possible.
    - b. Image must clearly show all items that will be hidden from view when project is completed. Pictures taken with telephone camera will not be accepted.
    - c. Pictures must be original pictures unedited, cropped or altered in any way.
  - 2. Supply a legend for the pictures to clarify the date, location, direction and/or wall in which the picture was taken.
  - 3. Submittal of these pictures to be part of project closeout 15050, 3.9

## PART 2 PRODUCTS

## 2.1 ELECTRIC MOTORS

- A. Each contractor to provide motor starters and transfer switches for motors & pumps under their contract.
- B. Electric Service: Refer to Division 16000 for required electrical characteristics.
- C. Motors: For continuous operation in 40 degrees C environment, and for temperature rise to ANSINEMA MG1 limits. Motor will operate satisfactorily without failure for a period of two (2) hours or more at ambient temperature of 120°F & with a minimum service factor of 1.5.

- D. Single Phase Motors: Split phase, Permanent split capacitor, or Capacitor start as Required.
- E. Three Phase Motors: Squirrel cage motors to ANSIIINEMA MG1 Class B, high efficiency type with thermistor system for motor frame sizes 254T and larger, ball bearings.
- F. Motors to be squirrel-cage type drip-proof enclosure unless otherwise indicated, constant speed, & across-the-line normal starting torque designed for quiet operation. Where T-frame motors are used, oversize motor by at least 10%.
- G. Motors to be sized to develop the required brake horsepower & to operate satisfactorily with a voltage variation of  $\pm 10\%$ , conforming to NEMA motor standards, dynamically balanced, & held to commercial tolerance.

## 2.2 PIPE, VALVE, & EQUIPMENT IDENTIFICATION

- A. Equipment Nameplates: Laminated three-layer plastic (Bakelite) with engraved black letters on light background color. Or aluminum with etched or engraved lettering on black background. 2.5"x.75" size, securely fastened to the equipment.
- B. Valve Tags: 18-gage polished brass, 1.5" in diameter & stamped for the appropriate service in \_25' backfilled letters & stamped with 1.75" brass S-Hook.
- C. Pipe Labels: Plastic clamp on legend & arrows, indicating contents of pipe & direction of flow. Identification shall be color coded per A-13.1 "Scheme of identification of Piping Systems."

## 2.3 PIPE HANGERS AND ACCESSORIES

- A. Manufacturers: Equal Fee & Mason
- B. Locations and Models:
  1. Water & Hydronic piping - #212 split ring hangers with support rods & Senile() 'trisolators'.
  3. Soil & Waste piping - #212 adjustable ring hangers with support rods & #241 riser clamps at each floor and as required.
  4. Gas piping - #212 split ring hangers with support rods.
  5. Air piping - #212 split ring hangers with support rods

## 2.4 ACCESS BOXES & PANELS

- A. Walls; Equal Smith 444730 or Josam #8650 with polished chrome plate face in tile walls. Equal Smith #4730-AKL, or Josam #SLA or #SLB, with bonderized prime-coated steel face & Allen lock in was of other finished rooms.
- B. Ceilings: Equal Acorn #8211-3-AKL or Josam #SLA bonderized prime-coated steel face with Allen lock.
- C. Floors: Equal Smith 414910 or Josam 418630-5 with XH plain aluminum or nickel-bronze non-skid top. Equal Smith #4920 for floors covered with vinyl reinforced or pure vinyl tile.
- D. Yard Boxes; Equal Brooks 36 HF or Frazer #12 cast concrete boxes with cast iron rim & hinged self-closing cast iron lid marked for function (gas shutoff, water, etc.), size to 12"x18"x12". Set flush with finished grade with 4" thick concrete pad under perimeter (but not under interior) of box.

## 2.5 VIBRATION ISOLATORS

- A. Equipment: Thy Curb Vibrocurbs or equal
- B. Ducts: Vent-fabric flexible connections with minimum of 6" full length
- C. Piping: Flexible connections, isolation hangers and expansion/contraction connectors
- D. All devices shall not exceed a noise criterion curve of 35 db SPL when measured on the flat response "C" scale, in occupied spaces.

## 2.6 FLASHING AND SLEEVES

- A. Concrete: Equal "Sperzel", rustproof, "Crete-Sleeve" at all penetrations through concrete, masonry, studs walls, or finished ceiling sized as required.
- B. Drywall, wood, synthetic stucco, etc: Provide sheet metal sleeves with minimum of 112" lip for all exposed locations. Prefinished backed enamel finish on exterior & chrome or painted finish on interior (verify colors with Architect).
- C. Root: By metal building supplier, coordinate with same for installation.

## 2.7 PAINTING OF EQUIPMENT:

- A. See Division 09000 for painting standards & requirements, Verify colors with Architect.

**PART 3****3.1 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Install equipment & accessories to permit access for maintenance. Relocate items as necessary to provide such access & without cost to the Owner.
- C. Examine the areas & conditions under which work of this section will be performed. Correct conditions detrimental to timely & proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.
- D. Proceed in a timely & proper manner as rapidly as the building construction will permit.
- E. Thoroughly clean items before installation.
- F. Each contractor (Plumbing, HVAC) shall be responsible to provide & install the required identification, hangers, vibration isolators, flashing, sleeves, motors, access panels & accessories as required for the installation of their systems under their applicable sections.
- G. Each Contractor shall be responsible to provide concrete thrust blocks, supports, vaults/pits, condenser pads, etc. as required for equipment under their contract.

**3.2 INSTALLATION OF IDENTIFICATION SYSTEMS**

- A. Pipe: Clamp on legend & arrows, indicating contents of pipe & direction of flow
  - 1. located as follows:
  - 2. Adjacent to each valve.
  - 3. At each branch & riser takeoff.
  - 4. At least once in each area that a pipe passes through (except finished areas) & at least every 40 feet.
- B. Valves:
  - 1. Identify valves by distinguishing numbers & letters assigned to them & listed on a valve chart,      2. Attach a brass tag on each valve with 1" to 3/4" #10 Brass-S-Hooks.
  - 3. Furnish 3 copies of printed valve list showing tag letter-number, service, & Location.
  - 4. Include in each maintenance manual.
- C. Equipment: Identify equipment with nameplates securely fastened to the equipment. Install nameplates with adhesive or screws. Install metal tags with corrosion resistant metal chains. Install material in accordance with manufacturer's instructions.

**3.3 INSTALLATION OF PIPE SUPPORTS**

- A. Support suspended piping with clevis or trapeze hangers & rods.
- B. Space hangers & supports for horizontal steel or PVC pipes according to the following schedule:
 

Pipe Size:	Maximum Spacing on Centers:
1.25" or smaller	8'-0"
1.5" to 3"	10'-0"
4" or larger	14'-0"
- C. Space hangers & supports for horizontal copper tubing according to the following schedule:
 

Tube Size:	Maximum Spacing on Centers:
1" or smaller	6'-0"
1.5"	7'-0"
8'-0"	2.5"
3" or larger	10'-0"
- D. Provide sway bracing on hangers longer than 18". Support vertical piping with riser clamps secured to the piping & resting on the building structure. Provide at each floor unless otherwise noted.
- E. Provide insulation continuous through hangers & rollers. Protect insulation by galvanized shields,
- F. Arrange pipe supports to prevent excessive deflection, & to avoid excessive bending stress.
- G. Support piping from inserts or anchors in concrete slabs. Provide the inserts under this Section.
- H. Hub less Piping: Provide hangers on the piping at each side of, & within 6" of, hub less pipe coupling so the coupling will bear no weight. Do not install hangers on couplings. Provide hangers adequate to maintain alignment & to prevent sagging of the pipe. Make adequate provision to prevent shearing & Misting of the pipe & the joint.

**3.4 INSTALLATION OF ACCESS BOXES & PANELS**

- A. Install access boxes or panels as required where piping, valves, equipment, etc. is concealed in walls, floor, or ceilings & will require maintenance or service.
- B. Boxes or panels to be flush with surfaces - level, square, & plumb, installed per manufacturer's requirements.

**3.5 INSTALLATION OF VIBRATION ISOLATORS**

- A. Provide isolators at all connections of duct work to equipment (except range hoods),
- B. Mount vibrating equipment on "Thy-Curb Vibrocurbs" with a minimum static deflection of 1".
- C. Isolate piping from structure in a manner to prevent transmission of vibration.
- D. Eliminate the source of any objectionable noise or vibration, or completely isolate it, without cost or inconvenience to the Owner.
- E. Provide expansion/contraction joints or fittings to allow perfect freedom of movement of piping during expansion & contraction without budding.
- F. Erect piping so the strain & weight does not come upon apparatus.

**3.6 INSTALLATION OF SLEEVES & OPENINGS**

- A. Provide sleeves for each pipe passing through walls, partitions, floors, roofs, & ceilings. Set pipe sleeves in place before concrete is placed. (Alternate method to core drill after concrete placement).
- B. For un-insulated pipe, provide sleeves two pipe sizes larger than the pipe passing through, or provide a minimum of 1/2" clearance between inside & outside of the pipe. For insulated pipe, provide sleeves of adequate size to accommodate the full thickness of pipe covering, with clearance for packing & caulking.
- C. Coordinate the caulking of the space between sleeve & pipe, equipment, pipe covering or duct by the fire-proofing contractor, see Division 07000.
- D. Caulk the space between sleeve & pipe, equipment, pipe covering or duct, using a noncombustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finished appearance, or pack with combustible material to within 1/2" of both surface faces, & provide the waterproof compound described above. See Division 07000 - Firestopping, for requirements & materials. Provide "ProSet" firestop systems for all PVC piping applications.
- E. Where items under your contract penetrate the roof, outer walls or waterproofing of any kind, provide under this Section, all base flashing & counter-flashing required at such penetrations.

**3.7 TRENCHING & BACKFILLING**

- A. Perform trenching & backfilling required for work under each section .
- B. Cut bottom of trenches to grade. Make trenches 12" wider than the greatest dimension of the pipe.
- C. Bedding & backfilling:
  - 1. Install piping promptly after trenching. Keep trenches open as short a time as practicable.
  - 2. Under the building & parking, install pipes on a 6" bed of damp sand. Backfill to bottom of slab or paving with damp sand.
  - 3. Outside the building, install underground piping on a 6' bed of damp sand. Backfill to 12" above pipe with damp sand & backfill remainder with native soil. Tamp in firmly in lifts to achieve uniform compaction.
  - 4. Do not backfill until installation has been approved & until Project Record Documents have been properly annotated.

**3.8 FIELD QUALITY CONTROL**

- A. Upon completion of the project, provide the Architect/Engineer with a certification that the installation has been inspected for proper operation & that it complies with all applicable codes.

**3.9 PROJECT CLOSE OUT**

- A. Upon completion of the plumbing installation and before final payment is made, the plumbing contractor will provide to the owner (2) two completed sets of as-built drawings detailing and showing any deviation from the contract documents, submittals(if different from original submittal), and any instruction / maintenance manuals supplied by manufacturer with equipment used on the project.
  - 1. It will be the responsibility of the plumbing contractor to provide all of the above from any sub-contractor that competes any work on the project under their contract.

END OF SECTION



**SECTION 15400****PLUMBING****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Section 15050-Basic Material & Methods
  - 1. Pipe and pipe fittings, valves
  - 2. Plumbing Specialties: Floor drains, interceptors, cleanouts, backflow preventers, water hammer arrestors, hose bibs/hydrants.
  - 3. Plumbing Fixtures & Equipment

**1.2 SUBMITTALS**

- A. Product Data: For review provide manufacturers literature for plumbing specialties, fixtures, and equipment.
- B. Operation & Maintenance Instructions: Comply with Division 01000. Include within each manual a copy of the Project Record Documents showing all work of this Section. Include relevant instructions & data.

**1.3 QUALITY ASSURANCE**

- A. Testing & Adjusting: Test pipe installation as indicated, & obtain Architects inspection & approval of installation prior to burial or concealment by further construction.
- B. Sterilization Certificate: Upon completion of water line sterilization, deliver to the Architect two (2) copies of an acceptable "Certificate of Performance" for that activity.
- C. Cathodic Protection: Upon completion of the work of this Section, deliver to the Architect sufficient data to prove that wrapping of steel piping has been tested & meets the specified requirements. Show date of inspection, voltages used, & name & address of the inspector.

**PART 2 PRODUCTS****2.1 SANITARY SEWER PIPING, BURIED BEYOND BUILDING**

- A. PVC Pipe: ASTM D3033 or D3034, SDR 35, with elastomeric gaskets.

**2.2 SANITARY SEWER PIPING, BURIED UNDER & ABOVE GRADE, WITHIN BUILDING**

- A. PVC Pipe: ASTM D2729 with solvent weld joints, Schedule 40 PVC.

**2.3 WATER PIPING, BURIED BEYOND BUILDING**

- A. Copper Tubing: ASTM B88, Type K, or ASTM B42, annealed with wrought copper fittings and compression joints:
- B. PVC Pipe: AWWA C902, or ASTM D1785, Schedule 40, or ASTM D2241, minimum 150 psig pressure rating with solvent weld joints.

**2.4 WATER PIPING, BURIED UNDER BUILDING**

- A. Copper Tubing: ASTM B88, Type K, annealed without fittings.

**2.5 WATER PIPING, ABOVE GRADE**

- A. Copper Tubing: ASTM B88, Type L, hard drawn, with cast brass or wrought copper fittings and Grade 95TA solder joints.

**2.6 NOT USED****2.7 NATURAL GAS PIPING, BURIED**

- A. Steel Pipe: ASTM A53, Schedule 40 black with polyethylene jacket and welded joints.

**2.8 NATURAL GAS PIPING, ABOVE GRADE**

- A. Steel Pipe: ASTM A53 or A120, Schedule 40 black (galvanized where exposed to weather), with malleable iron or forged steel fittings, screwed or welded.

**2.9 FLANGES, UNIONS, AND COUPLINGS**

- A. Pipe Size 2 inches and Under: malleable iron unions for threaded ferrous piping; bronze unions for Soldered copper pipe joints.
- B. Pipe Size Over 2 inches: forged steel flanges for ferrous piping; bronze flanges for copper piping; Neoprene gaskets.
- C. Grooved and Shouldered Pipe End Couplings: Malleable iron housing; "C" shape composition sealing gasket; steel bolts, nuts, and washers.
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

**2.10 GATE VALVES**

- A. Up to 2 inches: Bronze body, non-rising stem & hand wheel, inside screw, single wedge or disc, solder or threaded ends.
- B. Over 2 inches: Iron body, bronze trim, rising stem & hand wheel, OS & Y, single wedge, flanged or grooved ends.

**2.11 GLOBE VALVES**

- A. Up to 2 Inches: Bronze body, rising stem and hand wheel, inside screw, renewable composition disc, solder or screwed ends, with back seating capacity.
- B. Over 2 Inches: Iron body, bronze trim, rising stem & hand wheel, OS & Y, plug-type disc, flanged ends.

**2.12 BALL VALVES**

- A. Up to 2 Inches: Bronze or stainless steel body, stainless steel ball, Teflon seats and stuffing box ring, lever handle, solder or threaded ends.
- B. Over 2 Inches: Cast steel body, chrome plated steel ball, Teflon seat and stuffing box seals, lever handle, flanged.

**2.13 PLUG VALVES or GAS COCKS**

- A. Up to 2 Inches: Bronze body, bronze tapered plug, non-lubricated Teflon packing, threaded ends.
- B. Over 2 Inches: Cast iron body and plug, non-lubricated, Teflon packing, flanged ends.

**2.14 WATER PRESSURE REDUCING VALVES**

- A. Up to 2 Inches: Bronze body, stainless steel and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded and single or double union ends.
- B. Over 2 inches: Cast iron body, bronze fitted, elastomeric diaphragm and seat disc, flanged.

**2.15 RELIEF VALVES**

- A. Bronze body, Teflon seat, steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labeled.

**2.16 FLOOR DRAINS**

- A. See plans for Manufacturer:  
Equal Zurn ZN-415 floor & Shower drain, Dura-Coated cast iron body with bottom outlet, combination invertible membrane clamp & adjustable type B polished bronze strainer. Install with standard P-trap & in size as noted on plans.
- B. At all slab on grade locations install backwater valve to equal a Zurn Z-199.
- C. At all location where an equipment condensate drain DOES NOT run into floor drain install automatic trap primer to equal a Zurn Z-1022 automatic trap primer & Z-1023 trap primer connector.

**2.17 CLEANOUTS**

- A. Floor: Lacquered cast iron, two piece body with double drainage flange, weep holes, reversible clamping collar, and adjustable nickel-bronze strainer, round scoriated cover in service areas and round or square depressed cover to accept floor finish in finished floor areas.
- B. Wall: Line type with lacquered cast iron body and round epoxy coated gasketed cover, and round stainless steel access cover secured with machine screw.
- C. Cover plates: heavy polished stainless steel, wall & floor cover plates, installed flush with floor or wall, with

- adjustable watertight covers in floors & round chrome plated or stainless steel access plate & screw in walls.
- D. Cleanout plugs of extra heavy bronze.
- E. All exterior cover plates & cleanouts to have stainless steel screws.

### 2.18 BACKFLOW PREVENTORS

- A. Subject to the compliance with design and Authority Having Jurisdiction requirements, provide double check type assembly, equal to Ames 2000SS

### 2.19 WATER HAMMER ARRESTERS

- A. Type to be PDI WH-201, pre-charged suitable for operation in temperature range from 100 to 300° F & maximum 250 psig working pressure.

### 2.20 HOSE BIBS/HYDRANTS

- A. See plans Manufacturers & Model numbers.
- B. Interior Hose Bib: Bronze or brass, replaceable hexagonal disc, hose thread spout, chrome plated with vacuum breaker.
- C. Wall Hydrant: Non-freeze, anti-siphon, automatic self-draining type with chrome plated with wall plate hose thread spout, [removable key], and vacuum breaker.

### 2.21 SCHEDULED EQUIPMENT ON PLANS

- A. See Plans for list of equipment

### 2.22 WATER HEATERS

- A. See plans for Manufacturers & Models.
- B. Maximum working pressure: 150 psig

### 2.23 PIPE & VALVE INSULATION

- A. Glass Fiber Insulation: ANSI/ASTM C547; 1" to 3" thick Owens/Corning fiberglass, noncombustible insulation, 3 lb. density, "25 ASJKISSL-11" for Hot & Cold Water lines.
- B. Cellular Foam: Flexible, plastic; 1/2" Armstrong 'Armaflex sealed with Armstrong adhesive for condensate lines above ceilings or concealed in walls.
- C. Jacket:
  1. Vapor Barrier Jackets: Factory applied fiberglass reinforced vinyl 25ASJ vapor barrier with self-sealing adhesive joints.
  2. PVC Jackets: One piece, pre-molded type, Manville "Zeston 25150"
- D. Accessories;
  1. Insulation bands: 314" wide, galvanized steel.
  2. Fibrous Glass Cloth: Untreated; 9 oz/sq.yd. weight.
- E. Safety Insulation: Equal "Handy Shield" foam insulated, vinyl jacked recloseable protective covers.

## PART 3 EXECUTION

### 3.1 PREPARATION.

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside piping before assembly.
- C. Prepare piping connections to equipment with flanges or unions.
- D. Coordinate cutting or forming of roof or floor construction to receive drains to required invert elevations.
- E. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.
- D. Verify adjacent construction is ready to receive rough-in work of this Section.
- E. Examine the areas & conditions under which work of this section will be performed. Correct conditions detrimental to timely & proper completion of the work. Do not proceed until unsatisfactory conditions are corrected,
- F. Thoroughly clean items before installation.
- G. Examine the areas & conditions under which work of this sections will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

- H. Thoroughly clean items before installation.

### 3.2 INSTALLATION

- A. Proceed as rapidly as the building construction will permit.
- B. Provide dielectric connections wherever jointing dissimilar metals.
- C. Install piping to conserve building space and not interfere with use of space. Group piping whenever practical at common elevations.
- D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- E. Provide clearance for installation of insulation and access to valves and fittings.
- F. Slope water piping and arrange to drain at *low* points.
- G. install under slab water piping without joints.
- H. Install bell and spigot pipe with bell end upstream.
- I. Install specialties in accordance with manufacturer's instructions.
- J. Cut square, remove burrs, & clean inside of female copper tubing, filing to a bright finish. Apply solder flux with brush to tubing. Remove internal parts of solder-end valves prior to soldering.
- K. Soil piping shall be graded a minimum of 1/8" per foot & a maximum of 1/2" per foot in the direction of flow.
- L. Cutting & Patching: Provide cutting, patching, hangers, foundation openings & bucks, including cutting & patching of concrete, brick, paving, & curbs.
- M. Install Los Angeles pattern cast brass traps with brass nuts (chrome plated) for lavatories & sinks, except service sinks.
- N. Install all water piping within the building insulation envelope. No piping is to be on the cold side of the vapor barrier or in unheated attic spaces. Keep all piping concealed in walls, mechanical chases & spaces. Plumbing contractor to coordinate work with Insulation contractor to assure location of insulation envelope. The Architect shall promptly be notified of any difficulties in accomplishing this. Any deviations from this will be grounds for rejecting work.
- O. Minimum size of all waste, drain, and vent lines under slab shall be as follows: See plans for underslab pipe sizes.
- P. Install water heaters in accordance with manufacturer's instructions and to AGA, NSF, NFPA, & UL requirements. Coordinate with plumbing piping and related fuel piping, gas venting, or electrical work to achieve operating system.
- Q. Layout the plumbing system in careful coordination with the drawings, determining proper elevations for all components of the system & using only the minimum number of bends to produce a satisfactory functioning system,
- R. Layout pipes to fall within partition, wall or roof cavities, & to not require furring other than as shown on the drawings.
- S. Show no tool marks or threads on exposed plated, polished, or enameled connections from fixtures. Tape all finished surfaces to prevent damage during construction.
- T. Make changes in directions with fittings, make changes in mains sizes with eccentric reducing fittings. Unless otherwise noted, install water supply & return piping with straight side of eccentric fittings at top of the pipe.
- U. Screwed piping joints de-burr cuts & threads to requirements of ANSI B2.1. Do not ream exceeding internal diameter of the pipe. Use tenon tape on mate thread prior to joining other services.
- V. Remake leaky joints with new material, removing leaking section and/or fitting as directed. Do not use thread cement or sealant to tighten joint.

### 3.4 APPLICATION

- A. Use grooved mechanical couplings and fasteners, and dielectric connections only in accessible locations.
- B. Install unions downstream of valves and at equipment or apparatus connections.
- C. Install brass male adapters each side of valves in copper piped system. Sweat solder adapters to pipe.
- D. Install pressure regulators as required for each system or piece of equipment on all air, gas & water service.
- E. Install piping, equipment, & accessories to permit access for maintenance. Relocate items as necessary to provide such access & without cost to the Owner.
- F. Provide access doors where valves, motors, or equipment requiring access for maintenance are located in walls or chases above ceilings. Coordinate location of access doors with other trades as required.

### 3.5 SERVICE CONNECTIONS

- A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.
- B. Provide new gas service & coordinate with Gas Service Company the installation of gas meter and regulators. Gas service distribution piping to have initial minimum pressure of 7" wg (4oz). Provide regulators as required on each line serving gravity type appliances, sized in accordance with equipment.

### 3.6 INSTALLATION OF PLUMBING FIXTURES

- A. Set fixtures level and in proper alignment with respect to walls & floors, and with fixtures equally spaced.
- B. Install each fixture with chrome plated rigid or flexible supplies in proper alignment with fixtures & with each other, & with screwdriver stops, reducers, & escutcheons.
- C. Install flush valves in alignment with the fixture, without vertical or horizontal offsets.
- D. Grout or caulk wall and floor mounted fixtures watertight where the fixtures are in contact with walls & floors.
- E. Caulk deck-mounted trim at the time of assembly, including fixture and casework mounted. Caulk self rimming sinks installed in casework.
- F. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.
- G. Cap pipe openings to exclude contaminants (dirt, bugs, etc.) until fixtures are installed & final connections made.

### 3.7 INSTALLATION OF FINISH & ESCUTCHEONS

- A. Smooth up rough edges around sleeves with plaster or spackling compound.
- B. Provide 1" wide chrome or nickel plated escutcheons on all pipes exposed to view where passing through walls, floors, partitions, ceilings & similar locations. Size The escutcheons to fit pipe & coverings. Hold escutcheons in place with set screw.

### 3.8 INSTALLATION OF VALVES

- A. Provide valves in water, air & gas systems. Locate & arrange so as to give complete regulation of apparatus, equipment, & fixtures. Locate valves for easy accessibility & maintenance.
- B. Provide valves in at least the following locations:
  - 1. In branches & for headers of water piping serving a group of fixtures.
  - 2. On both sides of apparatus & equipment.
  - 3. For shutoff of risers & branch mains.
  - 4. For flushing & sterilizing the system.
  - 5. Where shown on plans.
- C. Install gate or ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install globe, ball or butterfly valves for throttling, bypass, or manual flow control services.

### 3.9 INSTALLATION OF PIPING INSULATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Maintain ambient temperatures & conditions required by manufacturers of adhesive & insulation.
- C. Continue insulation vapor barrier through penetrations.
- D. Piping Insulation:
  - 1. Locate insulation & cover seams in least visible places.
  - 2. Neatly finish insulation at supports, protrusions, & interruptions.
  - 3.. Insulation with Vapor Barrier: Insulate fittings, valves, unions, flanges. strainers. flexible connections, & expansion joints.
  - 4. Insulation without Vapor Barrier: Bevel & seal ends of insulation at equipment, flanges, & unions.
  - 5. Provide insert between support shield & piping, under the finish jacket, on piping 2' diameter or larger. Fabricate of cork or other heavy density insulating material suitable for temperature, not less than 6" long, of same thickness & contour as adjoining insulation.
  - 6. Insulate all hot & cold water supply & return lines with glass fiber with thickness as follows: 1"e or less with 1", 1.25" to 4"e with 1.5", & greater than 4"e with 2". Insulate condensate lines above ceilings or concealed in walls with cellular foam.
  - 7. Insulate all exposed drain & supply lines exposed under wall hung fixtures & lavatories with safety insulation to meet ANSI A177 & ADA codes for protection & accessibility of physically handicapped persons.
- E. Pipe Insulation Jackets:

1. Indoor, Concealed Hot Pipes: Furnish standard factory applied jackets with or without vapor barrier. Finish fittings, joints, & valves with glass cloth & adhesive. PVC jackets may be used.
2. Indoor, Concealed Cold Pipes: Furnish with vapor barrier jackets, factory applied. Furnish fittings, joints, & valves with glass cloth & vapor barrier adhesive.
3. Indoor, Exposed Pipes: Finish with PVC jackets.

### 3.10 INSTALLATION OF CLEANOUTS

- A. Secure the Architect's approval of locations for cleanouts in finished areas prior to installation. Locate at intervals of not more than 100 feet.
- B. Provide cleanouts of same nominal size as the pipes they serve, except where cleanouts are required in pipes 4" & larger provide 4" cleanouts unless otherwise noted.
- C. Make cleanouts accessible & ensure clearance at cleanout for rodding of drainage system.
- D. Extend cleanouts to finished floor or wail surface & provide cover plates as required.
- E. After pressure testing thoroughly lubricate threaded cleanout plugs with mixture of graphite and linseed oil.
- F. Provide exterior cleanouts with stainless steel screws and set in 4" thick concrete poured 12" around all sides, flush with finish grade.

### 3.11 INSTALLATION OF WATER HAMMER ARRESTERS

- A. Provide water hammer arresters on hot & cold water lines.
- B. Install in upright position at all quick closing valves, solenoids, isolated plumbing fixtures, & supply headers at plumbing fixture groups. install water hammer arresters behind access panels.
- C. Locate & size as specified or as shown on the Drawings, & where not shown locate in accordance with Plumbing & Drainage Institute Standard WH-201. Locate water hammer arrestors on all flushometer valves, showers, shower/tubs, sinks, & electronic solenoid valves.
- D. Where fixtures are not protected by water hammer arresters, provide 24" high air chambers on each water supply, properly sized & designed for maintenance & drainage.
- E. Install water hammer arrestors complete with accessible isolation valve.

### 3.12 INSTALLATION OF BACKFLOW PREVENTION

- A. Protect plumbing fixtures, faucets with hose connections, & other equipment having plumbing connection, against possible back-siphonage.
- B. Arrange testing of backflow devices as required by the governmental agencies having jurisdiction. Provide both the Owner & Architect of a copy of test & approval.
- C. Install backflow preventers to meet the Safe Drinking Water & Public Drinking Water Regulations as required by the State.

### 3.13 DISINFECTION STERILIZATION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flush & clean. Notify the Architect at least 48 hours prior to start of the disinfection process & perform disinfection process under Architect's observation. Ensure PH of water to be treated is between 7A & 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric),
- B. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form, throughout system to obtain 50 to 80 mg/L residual. Bleed water from outlets to ensure distribution.
- C. Maintain disinfectant in system for 24 hours. If final disinfectant residual test less than 25 mg/L, repeat treatment.
- D. Flush disinfectant from system. Take samples no sooner than 24 hours after flushing, & analyze in accordance with AWWA C601.
- E. Upon completion of sterilization, & 24 hours after final flushing, secure an analysis by a laboratory approved by the Architect, based on water samples from the system, showing lest negative for colt-aerogene organisms. Provide a total plate count of Jess than 100 bacteria per cc, or equal to the control sample. Take a minimum of 4 samples from the building system as remote from each other as possible.
- F. Upon completion of sterilization, secure & submit a Certificate of Performance required under Article 1.4 of this Section, stating system capacity, disinfectant used, time & rate of disinfectant applied, & resultant residuals in ppm at completion. Also give the results of coli-aerogene tests.
- G. If analysis results are not satisfactory, repeat the disinfection procedures & retest until specified standards

are achieved.

### 3.14 FIELD QUALITY CONTROL

- A. Upon completion of the plumbing installation the plumbing contractor shall provide the Architect/Engineer with the certifications that the installation has been inspected for proper operation & that it complies with all applicable codes including the BOCA National Plumbing Code.
- B. Plumbing system including, but not limited to, plumbing fixtures & trim, water piping (supply & DWV), etc. shall be tested & inspected.
- C. Plumbing Contractor shall submit the following:
  - 1. Sterilization Certificate per 1.04 of this Section
  - 2. Plumbing Certificate of Performance
  - 3. Certification of Backflow Prevention devices by state certified tester,
  - 4. As built/record drawings of actual installation to the Architect after completion of the project.
- D. Testing & Adjusting
  - 1. Temporary plug waste, vent, & root drain lines fill with water to the roof level, & allow to remain so for 24 hours without leakage,
  - 2. Test hot & cold water lines at 125 psi for a period of 12 hours without leaking.
  - 3. On all piping systems, a final test shall be made upon completion of system piping. The test pressure shall be the maximum operating pressure of the system. No leaks shall be detected. Comply with all local codes & ordinances & make all tests required by governing bodies.
- E. Where tests show material or workmanship to be deficient, replace or repair as necessary, & repeat the tests until the specified standards are achieved.
- F. Adjust systems to optimum standards of operation.

END OF SECTION





## SECTION 15600

## FURNACES AND HEAT PUMPS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Section 15050. Basic Materials & Methods
- B. Forced air furnaces
- C. Refrigerant cooling coils and heat pump units

## 1.2 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, connections, arrangement, accessories and controls
- B. Product Data: Provide manufacturer's installation instructions.
- C. Operating and Maintenance Instructions: Include relevant instructions
  - 1. Provide (1) one onsite training session and (2) complete sets of written instructions to the owner for operation and maintenance of all equipment used on the project.
    - a. All equipment must be operational before onsite training takes place.
- D. Provide a set of digital pictures on a CD for the owner's record of all under-slab and in wall work after inspection by the building inspector having jurisdiction over the project and before backfill and/or wall materials are installed.(applies to all work hidden and unable to view at projects completion)
  - 1. Supply pictures of the type and minimum quality listed below.
    - a. JPEG image, 5 mega pixel or better set to the largest format possible.
    - b. Image must clearly show all items that will be hidden from view when project is completed. Pictures taken with a telephone camera will not be accepted
    - c. Pictures must be original pictures unedited, cropped or altered in any way.
  - 2. Supply a legend for the pictures to clarify the date, location, direction and/or wall in which the picture was taken.
  - 3. Submittal of these pictures to be part of project closeout 15600, 3.4

## 1.3 WARRANTY

- A. Provide (1) one year manufacturer's warranty under provisions of Division 01000, Including, a 20 year coverage for heat exchangers.
- B. Provide one year manufacturer's warranty under provisions of Division 010000 including 5 year coverage for refrigeration compressors.

## PART 2 PRODUCTS

## 2.1 CONTROLS

- A. Units shaft have required operating controls, starters, motor over- load protection & safety controls.
- B. Thermostats: Programmable features - two separate temperatures per 24 hours & seven day programmable feature with touch screen operation.
- C. System Control: Heat, Off, Cool
  - 1. Fan Control: Automatic, On
  - 2. 24V Transformer (6VA Load), Honeywell VisionPro 8000 Commercial-TB822OU1003, & battery backup.

## 2.2 FORCED AIR FURNACES

- A. Type: Self-contained, packaged, factory assembled, pre-wired unit consisting of cabinet, supply fan, heat exchanger, burner, controls, air filter, 40-VA transformer, humidifier, refrigerant cooling coil and outdoor package containing compressor, condenser coil and condenser fan. Up, Counter, or Horizontal flow with gas burner and electric refrigeration.
- B. Heating & Cooling Performance: See plans for outputs, performance & model numbers,
- C. Heat Exchanger: Primary - Stainless steel, welded construction, Secondary - laminated polypropylene steel.
- D. Combustion Chamber: Welded stainless steel.
- E. Supply Fan: Centrifugal type, rubber mounted with direct drive with multispeed motor.
- F. Air Filters: One inch thick grass fiber disposable type.

- G. Gas Burner: Induced combustion type with combination gas valve and pressure regulator, manual shut-off, pilot valve, electronic pilot ignition, thermocouple pilot safety device, & 100% outdoor combustion air. A.G.A. design certified.
- H. Burner Operating Controls: Low voltage, adjustable room thermostat controls burner via printed circuit board control in furnace; high limit control with fixed stop de-energizes burner on high bonnet temperature. Control supply fan in accordance with bonnet temperature. Include manual switch for continuous operation.
- I. Evaporator Coil: Copper tube aluminum fin coil assembly, with one piece molded high-impact plastic drain pan, drain connection, refrigerant piping connections, and factory installed thermostatic expansion valve,
- J. PVC schedule 40 vent & combustion piping for gas-fired condensing furnaces.

## 2.4 HEAT PUMPS

- A. See plans for Manufacturer, Model, sizes, & performance.
- B. Units: Self-contained, split system package factory assembled & pre-wired units for outdoor installation & condensing of cabinet, compressors, condensing coil & fans, integral sub-cooling coil, controls, & liquid line receiver.
- C. Cabinet: Galvanized steel with baked enamel finish & removable access door or panels with quick fasteners.
- D. Compressor: Hermetic, 1750 rpm, resiliently mounted integral with condenser, with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and filter drier.
  - 1. Use R-410a
- E. Air Cooled Condenser: Aluminum fin seamless copper tube coil, direct drive vertical discharge propeller fan resiliently mounted, galvanized fan guard, permanently lubricated ball bearing motors built-in current & overload protection.
- F. Controls: High & low pressure cutouts for compressor, oil pressure control, non-recycling pump down & reset relay. Provide low ambient controls to permit operation down to 35F ambient temperature. Provide timer circuits, to prevent rapid loading & unloading of compressor.

## 2.5 FLUE SYSTEMS

- A. For gas equipment exhaust per manufacturer's specifications.
- B. For gas equipment exhausts up to 1000F continuous/1400F intermittent use double wall construction with 0.035" stainless steel interior & 0.025" aluminum external skin under positive pressure, Equal Selkirk Metalbestos model PC vent pipe.
- C. Flue systems to include all piping, breeching, support brackets, fire stops, terminators, caps, attic insulation shields, etc. for complete system. All component parts to be Metalbestos recommended use for the type of flue system.
- D. For condensing furnaces use PVC schedule 40 vent & combustion piping.
- E. For instantaneous water heaters provide vent pipe as recommended by the water heater manufacturer.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install equipment & specialties in accordance with manufacturer's instructions.
- B. Mount air cooled condenser package on concrete pad. Install exterior concrete equipment pads for condensing units.
- C. Tough-up scratches & abrasions to be invisible to the unaided eye from a distance of 5'-0".
- D. Provide for connection to electrical service. Refer to Division 16000.
- E. Route piping in orderly manner, plumb and parallel to building structure, and maintain gradient. Install piping to conserve building space, and not interfere with use of space and other work. Group piping whenever practical at common elevations. Conceal piping in walls, mechanical rooms, or attic spaces.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance for installation of insulation, and access to valves and fittings. Provide non-conducting dielectrical connections when joining dissimilar metals. Pressure test system with dry nitrogen to 200 psig. Perform final test at 27" vacuum and 200 psig. Test to no leakage.
- H. Charge system with refrigerant & put into operation, test equipment performance. Provide cooling season start-up & heating season shut-down for first year of operation.

- I. Do not operate fans until ductwork is clean, miters are in place, bearings lubricated, & fans have been test run under observation.
- J. Where piping, flues, ductwork etc. pass from heated spaces into non-heated spaces (attics, outside, etc.) all openings must be caulked & made airtight around penetrations. Provide metal fire stops on sheet metal flues rather than caulk.
- K. Caulk around all piping, flues, ductwork, etc. that pass through fire-rated assemblies (walls, ceilings, etc.) using a non-combustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finish appearance. See Division 07000 - Firestopping, for requirements & materials.

### 3.2 APPLICATION

- A. Provide line size liquid indicators in main liquid line leaving condenser, or if receiver is provided, in liquid line leaving receiver.
- B. Provide refrigerant charging valve connections in liquid line between receiver shut-off valve & expansion valve.
- C. Utilize flexible connectors at or near compressors where piping configuration does not absorb vibration.
- D. Provide vent terminal kits for vent & combustion air for each condensing furnace installed per manufacturer's instructions.
- E. Verify electrical service characteristics before ordering equipment.
- F. Air handling units to be mounted within 112" of level, for proper condensate drainage. The condensate drainage is NOT to be externally trapped (drain assembly is internally trapped). On condensing furnaces the condensate drain can NOT be run to exterior of building it must be internally plumbed,
- G. Verify physical size of equipment to fit in space provided with space allowed for service prior to ordering equipment.
- H. Where items of this Section penetrate roof, outer walls, or waterproofing of any kind, provide under this Section, all base flashing & counterflashing required at such penetration.
- I. Systems to be balanced per Section 15990 - once for heating season & once for cooling season, must be balanced twice within the first year. Owner to be instructed on different settings for each season.

### 3.3 FIELD QUALITY CONTROL & INSTRUCTIONS

- A. Upon completion of this portion of the Work, & prior to its acceptance by the Owner, provide a qualified engineer & fully instruct the Owner's maintenance personnel in the proper operation & maintenance of all items provided under this Section.
- B. Demonstrate the contents of the approved operation & maintenance manual required under this Section.
- C. Upon completion of the HVAC system installation, the HVAC contractor shall provide the Architect/Engineer with certification that the installation has been inspected for proper operation & that it complies with all applicable codes.
- D. The HVAC contractor shall submit the following:
  - 1. HVAC Certificate of Performance
  - 2. Air Flow test results per Section 15990
  - 3. As-build/record drawings to the Architect of completed systems.

### 3.4 PROJECT CLOSE OUT

- A. Upon completion of mechanical/HVAC installation and before final payment is made, the mechanical/HVAC contractor will provide to the owner (2) two completed sets of as-built drawings detailing and showing any deviation from the contract documents, submittals (if different from original submittal), and any instruction/maintenance manuals supplied by manufacturer with equipment used on the project.
  - 1. It will be the responsibility of the mechanical/HVAC contractor to provide all of the above from any sub-contractor that completes any work on the project under their contract.

END OF SECTION



## SECTION 15880

## AIR DISTRIBUTION

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Section 15050, Basic Materials & Methods
- B. Filters.
- C. Ductwork & ductwork accessories.
- D. Volume control dampers.
- E. Fire dampers,
- F. Flexible duct connections.
- G. Diffusers, boots, registers, grilles.
- H. Louvers & roof hoods.
- I. Exhaust Fans

## 1.2 SUBMITTALS

- A. Shop Drawings: Indicate for manufactured products & assemblies, & include electrical characteristics & connection requirements.
- B. Product Data: Provide for manufactured products & assemblies, & include electrical characteristics & connection requirements.
- C. Operating & Maintenance Instructions: Include instructions for lubrication, filter replacement, spare parts lists, & wiring diagrams.

## PART 2 PRODUCTS

## 2.1 FILTERS

- A. Washable Permanent Panel Filters: 14 mesh steel screen, zinc electroplated, stainless steel, or aluminum, rod reinforced; enclosed in galvanized steel or stainless steel frame. Size as required with thickness of 1/2 inch to one inch.
- B. Disposable. Panel Filters: Fiber blanket, factory sprayed with flameproof, non-drip, non-volatile adhesive. Size as required with 1" thickness set in casing of cardboard frame with perforated metal or plastic retainer. Galvanized steel frame with expanded metal grid on outlet side & steel rod grid on inlet side required on filter larger than 30"x30". Performance Rating to be 500 FPM face velocity.

## 2.2 DUCTWORK

- A. Materials
  - 1. Steel Ducts: Galvanized steel sheet, lock-forming quality.
  - 2. Insulated Flexible Ducts: Flexible duct wrapped with flexible 1" thick glass fiber insulation, enclosed by seamless vapor barrier jacket.
  - 3. Stainless Steel: 0.043" (18MSG) thickness, unlined for range hood exhaust systems, lock forming quality, & watertight construction for dishwasher hoods.
  - 4. Sealant: Non-hardening, water resistant, fire resistive, used alone or with tape.
- B. Metal Ductwork
  - 1. Fabricate & support in accordance with SMACNA HVAC Duct Construction Standards - Metal & Flexible except as indicated.
  - 2. Construct T's, bends, & elbows with radius of 1-1/2 times width of duct on center line. Where not possible provide turning vanes.
  - 3. Increase duct sizes gradually, not exceeding 30 degrees divergence & 45 degrees convergence.
  - 4. Connect flexible ducts to metal ducts with liquid adhesive plus tape or adhesive plus sheet metal screws.
  - 5. Use crimp joints with or without bead for joining round duct sizes 8 inch & smaller with crimp in direction of air flow.

## 2.3 VOLUME CONTROL DAMPERS.

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal & Flexible, & as indicated.

- B. Fabricate splitter dampers of material same gage as duct to 24 inches size in either direction, & two gages heavier for larger sizes. Secure with continuous hinge or rod. Operate with minimum 1/4 inch diameter rod.
- C. Fabricate single blade dampers for duct sizes to 12 x 30 inch.
- D. Fabricate multi-blade damper of opposed blade pattern with maximum blade sizes 12 x 72 inch. Assemble center & edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
- E. Except in round ductwork 12 inches & smaller, provide end bearings.
- F. Provide locking, indicating quadrant regulators on single & multi-blade dampers. Where width exceeds 30 inches provide regulator at both ends.

#### 2.4 FIRE & SMOKE DAMPERS

- A. All fire dampers must be dynamic rated & fabricated in accordance to meet UL-55 & Jor NFPA-90A, & as indicated.
- B. Equal these Manufacturers:
  1. Ruskin, Model IBD2 style A,B, or C (interlocking blade fire damper).
  2. Greenheck, Model DFD-150 (less than 3 hour rated barriers).
  3. Greenheck, Model DFD-350 (3 or more hour rated barriers).
  4. Ruskin, Model FSD35 with 120V actuator (combination fire & smoke).
  5. Safe-Air 'Thermo/Guard', Model A240R(Combination fire & volume control).
- C. Fabricate curtain type dampers with blades out of air stream except for 1.0 inch pressure class ducts up to 12 inches in height.

#### 2.5 BACKDRAFT DAMPERS.

- A. Gravity back draft dampers, size 18 x 18 inches or smaller, furnished with air moving equipment, may be air moving equipment manufacturers standard construction.
- B. Fabricate multi-blade, parallel action gravity balanced back draft dampers of galvanized steel, or extruded aluminum, with center pivoted blades, with seated edges, linked together, steel bail bearings, & plated steel pivot pin.

#### 2.6 AIR TURNING DEVICES/EXTRACTORS

- A. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.
- B. Multi-blade device with radius blades attached to pivoting frame & bracket, steel or aluminum construction, with push-pull operator strap.

#### 2.7 FLEXIBLE DUCT CONNECTIONS

- A. UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, approximately 3 inches wide, crimped into metal edging strip.

#### 2.8 DUCT ACCESS DOORS

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal & Flexible Ducts
- B. Access doors smaller than 12 inches square may be secured with sash locks.
- C. Access doors with sheet metal screw fasteners are not acceptable.

#### 2.9 AIR OUTLETS & INLETS

- A. Equal these Manufacturers:
 

1. Anemostat	6. Carnes
2. Hart & Cooley	7. Lima
3. J & J Register	6. Metalaire
4. Krueger	9. Price Industries
5. Tuttle & Bailey	
- B. Ceiling Diffusers: Round or Rectangular adjustable pattern, stamped or spun, multi-core type diffuser to discharge air with sectorizing baffles where indicated; radial opposed blade damper & equalizing grid; baked enamel off-white finish.
- C. Modified Light Troffer Diffusers: Single or Double plenum type constructed of galvanized steel with welded or soldered joints & finish matte black inside, with volume & pattern controllers, 5 inch round or oval top or side air inlet.
- D. Registers/Grilles: Streamlined & individually adjustable blades, with baked enamel off-white finish.

- E. Exterior Louvers: Weatherproof & minimum 4 inches deep with blades on 45 degree slope, heavy channel frame, bird screen with 1/2 inch square mesh for exhaust & 3/4 inch for intake.
  - 1. Material; 12 gage thick extruded aluminum.
  - 2. Finish: Factory anodized finish to match adjacent surfaces, verify color with Architect/Engineer.

## 2.10 DUCTWORK INSULATION

- A. Flexible Glass Fiber: ASTM C612; flexible, non-combustible blanket, 'K' Value of 0.29 at 75°F, Density of 1.5 (bleu ft, & Vapor Barrier Jacket of Kraft paper reinforced with glass fiber yam & bonded to, aluminized film, secured with pressure sensitive tape.
- B. Rigid Glass Fiber: ASTM C612; rigid, noncombustible blanket, 'K' Value of 0,29 at 75°F, Density of 2.0lb/cu ft, & Vapor Barrier Jacket of Kraft paper reinforced with glass fiber yarn & bonded to aluminized film, secured with pressure sensitive tape.
- C. Canvas Jacket: UL listed fabric, 6 oz/sq yd ,plain weave cotton treated with dilute fire retardant lagging adhesive.
- D. Duct Liner; ASTM C553; flexible, noncombustible blanket, 'K' Value of ASTM C518, 0.28 at 75°F, Density of 1.5 lbcu ft, Maximum Velocity on Coated Air Side: 6,000 ft/min, use waterproof fire retardant type Adhesive, with Liner Fasteners of galvanized steel, self adhesive pad or welded with press on head.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install fans on vibration isolators.
- C. Provide drain pans & down spouts for cooling coil banks more than one coil high. Provide eliminators mounted over drain pan.
- D. Do not operate fans for any purpose until ductwork is clean, filters are in place, bearings lubricated, & fan has been test run under observation.
- E. Install fans with resilient mountings & flexible electrical leads. Install flexible connections specified between fan inlet & discharge ductwork. Flexible connectors shall not be in tension while running.
- F. Provide fixed sheaves required for final air balance.
- G. Provide safety screen where fan inlet or outlet is exposed.
- H. Provide back draft dampers on discharge of exhaust fans & as indicated.
- I. Install flexible connections specified between fan inlet & discharge ductwork, Flexible connectors shall not be in tension while running.
- J. Prevent passage of unfiltered air around filters with felt, rubber, or neoprene gaskets.
- K. Install filter gage static pressure taps upstream & downstream of filters. Mount filter gages on outside of filter housing or filter plenum, in accessible position. Adjust & level.
- L. Provide openings in ductwork where required to accommodate thermometers & controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage.
- M. Locate ducts with sufficient space around equipment to allow normal operating & maintenance activities.
- N. Connect diffusers or troffer boots to low pressure ducts with 5 feet maximum length of flexible duct, Hold in place with strap or clamp.
- O. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- P. Provide fire dampers at locations indicated. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings & hinges.
- Q. Provide vent-fabric flexible connections immediately adjacent to equipment in ducts associated with fans & motorized equipment, of minimum 6' full length.
- R. Provide duct access doors for inspection & cleaning before & after filters, coils, fans, automatic dampers, at fire dampers, & elsewhere as indicated.
- S. Provide minimum B x 8 inch size for hand access, 18 x 18 inch size for shoulder access.
- T. Check location of air outlets & inlets & make necessary adjustments in position to conform with architectural features, symmetry, & lighting arrangement.

- U. Provide balancing dampers on duct take-off to diffusers, & grilles & registers, regardless of whether dampers are specified as part of the diffuser, or grille & register assembly. Also provide manual dampers on Fresh Air (FA) ducts at connection to Return Air (RA) ducts to balance F.A. from 0 to 100% of duct cap.
- V. Paint ductwork visible behind air outlets & inlets matte black. Refer to Division 09000. Connect branch take-offs to include prefabricated air scoops or air take-offs formed of galvanized sheet metal. Provide operating handles when required.

### 32 INSTALLATION OF DUCTWORK INSULATION

- A. Provide insulation with vapor barrier when air conveyed may be below ambient temperature.
- B. Secure insulation with vapor barrier with wires & seal jackets joints with vapor barrier adhesive or tape to match jacket.
- C. Install without sag on underside of ductwork. Use adhesive or mechanical fasteners where necessary to prevent sagging.
- D. Seal vapor barrier penetrations by mechanical fasteners, with vapor barrier adhesive. Stop & point insulation around access doors & damper operators to allow operation without disturbing wrapping.
- E. Secure insulation without vapor barrier with staples, tape or wire,
- F. Interior supply, return, & fresh air ductwork shall have coated 112" duct liner with adhesive applied to cover 100% of duct interior, for all rectangular ducts.
- G. All fresh air & make-up air ducts shall be wrapped with 2" duct insulation.
- H. Round sheet metal ducts shall be wrapped with 1", 314 lb. R=3.5 foil backed duct insulation.

END OF SECTION



**SECTION 15990****TESTING, ADJUSTING, & BALANCING****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Air systems

**1.2 SUBMITTALS**

- A. Draft reports; Submit for review prior to final acceptance of Project.
- B. Test Reports: Submit prior to final acceptance of project & for inclusion in operating & maintenance manuals. Provide in soft cover, letter size, 3-ring binder, with index page & tabs, & cover identification. Include reduced scale drawings with air outlets & equipment identified to correspond with data sheets, & indicating thermostat locations.
- C. Report Forms: to equal AABC National Standards for Total System Balance forms or Forms prepared following ASHRAE 111.

**PART 2 PRODUCTS – not used.****PART 3 EXECUTION****3.1 EXAMINATION & PREPARATION**

- A. Before commencing work, verify that the systems are complete & operable.
- B. Report any deficiencies or abnormal conditions in mechanical systems which prevent system balance.
- C. Beginning of work means acceptance of existing conditions.
- D. Recorded data shall represent actually measured or observed conditions.
- E. Permanently mark settings of valves, dampers & other adjustment devices. Set & lock memory stops.

**3.2 INSTALLATION TOLERANCES**

- A. Air Handling Systems: Adjust to within  $\pm 5\%$  for supply systems &  $\pm 10\%$  for return & exhaust systems of design.
- B. Air Outlets & Inlets: Adjust to within  $\pm 10\%$  of design.

**3.3 AIR SYSTEM PROCEEDURE**

- A. Adjust air handling & distribution systems to provide required or design supply, return, & exhaust air quantities.
- B. Make air quantity measurements in ducts by traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets & outlets.
- D. Use volume control devices to regulate air quantities only to extent that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required, Vary branch air quantities by damper regulation.
- F. Measure static air pressure conditions on air supply units, including filter & coil pressure drops, & total pressure across the fan. Allow for 50 % loading of fillers.
- G. Adjust automatic outside air, return air, & exhaust air dampers for design conditions.
- H. Measure temperature conditions across outside air, return air, & exhaust air dampers to check leakage.
- I. Where modulating dampers are provided, take measurements & balance

END OF SECTION



**DIVISION 16**

**ELECTRICAL**

16050	Basic Electrical Materials and Methods	16050-1 to 4
16100	Wiring Methods	16100-1 to 5
16400	Service and Distribution	16400-1 to 3
16500	Lighting	16500-1 to 2
16720	Fire Alarm System	16720-1 to 4



## SECTION 16050

## BASIC ELECTRICAL MATERIALS AND METHODS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. General & Supplementary Conditions, & Division 1
- B. Temporary Electrical Service per Section 01500 (See Requirements)
- C. Grounding and bonding.
- D. Connection of utilization equipment.
- E. Supports.
- F. Identification.

## 1.2 SUBMITTALS

- A. Product Data: Provide catalog data for grounding and bonding devices,
- B. Operating and Maintenance Instructions: Provide maintenance and operating instructions for battery powered lighting units.
  - 1. Provide (1) one onsite training session and (2) complete sets of written instructions for set up, operation and maintenance of all lighting equipment supplied on the project by a representative that is familiar with the use, setup and maintenance of the equipment.
- C. Provide a set digital pictures on a CD for the owners record of all under-slab and in wall work after inspection by the building inspector having jurisdiction over the project and before backfill and/or wall materials are installed. (applies to all work hidden and unable to view at projects completion)
  - 1. Supply pictures of the type and minimum quality listed below.
    - a. JPEG image, 5 mega pixel or better set to the largest format possible.
    - b. Image must clearly show all items that will be hidden from view when project is completed. Pictures taken with a telephone camera will not be accepted.
  - 2. Supply a legend for the pictures to clarify the date, location, direction and/or wall in which the picture was taken.
  - 3. Submittal of these pictures to be part of project closeout 16050, 3.4

## 1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSUNPPA 70 (NEC)
- B. Conform to all Local, City & State Codes
- C. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.
- D. Certify inspection & approval from authority having jurisdiction

## 1.4 PROJECT CONDITIONS

- A. Existing project conditions indicated on Drawings are based on casual field observation or existing record documents.
- B. Verify field measurements and circuiting arrangements are as shown on Drawings.
- C. Verify removal of existing electric work.
- D. Report discrepancies to Architect/Engineer before disturbing existing installation or commencing work.

## 1.5 QUALITY ASSURANCE &amp; COORDINATION

- A. Perform Work to requirements of NECA Standard of Installation.
- B. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other Sections to determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation and start-up of equipment furnished under other Sections

## PART 2 PRODUCTS

## 2.1 GROUNDING MATERIALS

- A. Ground Rod: Copper, minimum 5/8" diameter x 10 feet length.

- B. Provide active electrodes as required to perform work.
  1. Metallic-salt-filled copper-tube electrode, length & shape as required; with U-bolt pressure plate connector or connector for exothermic welded connection.
- C. Mechanical Connectors: Bronze.

## 2.2 BASIC MATERIALS

- A. Steel channel: Galvanized or painted steel.
- B. Miscellaneous Hardware; Treat for corrosion resistance.
- C. Nameplates: Engraved three-layer laminated plastic, black letters on white background or embossed adhesive tape labels, with 3/16 inch white letters on black background.
- D. Wire and Cable Markers: Cloth markers, split sleeve or tubing type.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install Products in accordance with manufacturer's instructions.
- B. Install ground electrodes at locations indicated & additional rod electrodes as required to meet Regulatory Requirements.
- C. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing as required by code & bond steel together, & to ground rod(s).
- D. Provide bonding to meet Regulatory Requirements.
- E. Provide isolated equipment grounding conductor for circuits supplying electronic cash registers, personal computers and in all licensed areas of Health Care Facilities.
- F. Make electrical connections to utilization equipment in accordance with equipment manufacturer's instructions.
  1. Verify that wiring and outlet rough-in work is complete and that utilization equipment is ready for electrical connection, wiring, and energization.
  2. Make wiring connections in control panel or in wiring compartment of pre-wired equipment. Provide interconnecting wiring where indicated.
  3. Install and connect disconnect switches, controllers, control stations, and control devices as indicated.
  4. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit in damp or wet locations.
  5. Install pre-fabricated cord set where connection with attachment plug is indicated or specified, or use attachment plug with suitable strain-relief clamps.
  6. Provide suitable strain-relief clamps for cord connections to outlet boxes and equipment connection boxes,
  7. Use wire & cable with insulation suitable for temperatures encountered in heat producing equipment.
- G. Install support systems sized and fastened to accommodate weight of equipment and conduit, including wiring, which they carry.
  1. Fasten hanger rods, conduit clamps, and outlet and junction boxes to building structure using expansion anchors, preset inserts, or beam clamps.
  2. Use toggle bolts or hollow wall fasteners in hollow masonry, plaster, or gypsum board partitions and wafts; expansion anchors or preset inserts in solid masonry walls; self-drilling anchors or expansion anchor on concrete surfaces; sheet metal screws in sheet metal studs; and wood screws in wood construction.
  3. Do not fasten supports to piping, ceiling support wires, ductwork, mechanical equipment, or conduit.
  4. Do not use powder-actuated anchors.
  5. Do not drill structural steel members.
  6. Fabricate supports from structural steel or steel channel.
  7. Install free-standing electrical equipment on concrete pads.
  8. Install surface-mounted cabinets and panelboards with minimum of four anchors.
  9. Provide steel channel supports to stand cabinets 1 inch off wall in wet locations.
  10. Bridge studs top and bottom with channels to support flush-mounted cabinets and panelboards in stud walls.
- H. Identify electrical distribution and control equipment, and loads served, to meet regulatory requirements and as indicated or scheduled.
  1. Degrease and clean surfaces to receive nameplates and tape labels.

2. Secure nameplates to equipment fronts using screws, rivets, or adhesive, with edges parallel to equipment lines. Secure nameplate to inside face of recessed panelboard floors in finished locations.
3. Use nameplates with 1/8" lettering to identify individual switches & circuit breakers, wall switches, receptacle circuits, & loads served.
4. Use nameplates with 1/4" lettering to identify distribution and control equipment.
- I. Install wire markers on each conductor in panelboard gutters, pull boxes, and at load connections,
  1. Use branch circuit or feeder number to identify power and lighting circuits.
  2. Use control wire number as indicated on equipment manufacturer's shop drawings or schematic & interconnection diagrams to identify control wiring\_

### 3.2 TRENCHING & BACKFILLING

- A. Perform trenching & backfilling associated with the work of this Section in strict accordance with the provisions of Division 02000 of these Specifications.
- B. Cut bottom of trenches to grade. Make trenches 12" wider than the greatest dimension of the conduit.
- C. Install conduit promptly after trenching. Keep trenches open as short a time as practicable.
- D. Under the building or parking, install conduit on a 2' bed of damp sand. Backfill to bottom of slab or paving with damp sand, or crushed - gravel, stone, or slag.
- E. Outside the building, install underground conduit on a 2" bed of damp sand. Backfill to 6" above conduit with damp sand or crushed slag. Backfill to within 12" of finish grade with acceptable till material. Backfill remainder with native soil. Tamp in firmly in lifts to achieve uniform compaction.
- F. Do no backfill until installation has been approved & until Project Record Documents have been properly annotated.

### 3.3 FIELD QUALITY CONTROL

- A. Upon completion of the electrical & communication installation, the electrical & communication contractors shall provide the Architect I Engineer with a certificate the installation has been inspected for proper operation & that it complies with all applicable codes including NFPA 70 (National Electrical Code) & NFPA 72 (National Fire Alarm Code)\_
- B. The electrical & communication contractors shall submit certificates of performance for:
  1. Electrical lighting & power distribution systems including, but not limited to, distribution equipment, wiring, conduit, light fixtures, switches, receptacles, motor starters, & junction boxes.
  2. Emergency lighting & power systems including, but not limited to, wiring, conduit, light fixtures, junction boxes, etc.
  3. Telephone Systems including, but not limited to, telephone outlets with jacks & wire.
  4. Fire Alarm System including, but not limited to, annunciator panel, smoke detectors, manual stations, heat detectors, horn/strobes, strobes, etc.

### 3.4 PROJECT CLOSE OUT

- A. Upon completion of electrical and/or communication installation and before final payment is made, the electrical contractor will provide to the owner (2) two completed sets of as-built drawings detailing and showing any deviation from the contract documents, submittals (if different from original submittal), and any instruction/maintenance manuals supplied by manufacturer with equipment used on the project.
  1. It will be the responsibility of the electrical contractor to provide all of the above from any sub-contractor that competes any work on the project under their contract.
    - a. All data, telephone, security, sound, fire alarm and cable TV wiring provided by the electrical contractor on this project or by one of the electrical contractors sub-contractors shall be included as part of the as-built requirement.

END OF SECTION





**SECTION 16100****WIRING METHODS****PART 1 GENERAL****1.1 SUMMARY**

- A. Section 16050 - Basic Electrical Materials & Methods
- B. Conduit and fittings.
- C. Electrical Metallic Tubing.
- D. Electrical boxes & Service fittings..
- E. Wire and cable.
- F. Wiring devices.
- G. Rough-in Only unless noted otherwise for:
  - 1. Telephone Systems & Service
  - 2. Cable TV
  - 3. Thermostats
  - 4. Data

**1.2 SUBMITTALS**

- A. Product Data: For review.
  - 1. Provide wiring device configurations, ratings, dimensions, and color selections.
  - 2. Provide service fitting configurations, dimensions, and finish and color selections.

**1.3 REGULATORY REQUIREMENTS**

- A. Conform to requirements of NFPA 70.
- B. Furnish products listed by UL or other testing firm acceptable to authority having jurisdiction

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with NECA Standard of Installation.

**PART 2 PRODUCTS****2.1 CONDUIT AND FITTINGS**

- A. Conduit:
  - 1. Metal Conduit and Tubing: Galvanized steel.
  - 2. Flexible Conduit: Steel or Aluminum.
  - 3. Liquidtight Flexible Conduit: Flexible conduit with PVC jacket.
  - 4. Plastic Conduit and Tubing: NEMA TC 2, PVC. Use Schedule 40 conduit.
  - 5. Non-Metallic Tubing: NEMA TC-13.
- B. Conduit Fittings:
  - 1. Metal Fittings and Conduit Bodies: NEMA FB 1.
  - 2. Plastic Fittings and Conduit Bodies: NEMA TC 3.

**2.2 ELECTRICAL BOXES**

- A. Boxes:
  - 1. Sheet Metal: NEMA OS 1, galvanized steel.
  - 2. Cast Metal: Aluminum or Cast fer alloy, deep type, gasketed cover, threaded hubs.
  - 3. Nonmetallic: NEMA OS 2.
- B. Floor Boxes for Installation in Poured Concrete Floors: Semi-adjustable, cast iron.
- C. Hinged Cover Enclosures: NEMA 250, Type 1, steel enclosure with manufacturer's standard enamel finish and continuous hinge cover,, held closed by flush latch operable by screwdriver.
- D. Large Cast Metal Boxes:
  - 1. Surface-Mounted Type: NEMA 250, Type 4 and Type 6, flat flanged, surface-mounted junction box; cast aluminum box and cover with ground flange, neoprene gasket, and stainless steel cover screws.
  - 2. Underground Type: NEMA 250, Type 4, Inside flanged, recessed cover box for flush mounting; galvanized cast iron box and plain cover with neoprene gasket and stainless steel cover screws.

**2-3 BUILDING WIRE AND CABLE**

- A. Feeders and Branch Circuits 8 AWG & Larger: Copper stranded conductor, 600volt insulation, THW or THHN/THWN.
- B. Feeders and Branch Circuits smaller than 8 AWG; Copper conductor, 600 volt insulation, 'DV, THW, or THHN/THWN. solid conductor.
- C. Control Circuits: Copper, stranded conductor, 600 volt insulation, THW,

**2.4 ARMORED CABLE**

- A. Armored Cable, Size 14 Through 4 AWG: Copper conductor, 300 volt insulation, rated 60 degree C, Type AC.
- B. Armored Cable, Size 4 Through 1 AWG: Copper conductor, 300 volt insulation, rated 60 degree C, Type AC.

**2.5 REMOTE CONTROL AND SIGNAL CABLE**

- A. Control Cable for Class 1 Remote Control and Signal Circuits: Copper conductor, 600 volt insulation, rated 60 degree C, individual conductors twisted together & covered with PVC jacket.
- B. Control Cable for Class 2 or Class 3 Remote Control & Signal circuits: Copper conductor, 300 volt insulation, rated 60 degree C, individual conductors twisted together & covered with PVC jacket; UL listed.
- C. Plenum Cable for Class 2 or Class 3 Remote Control and Signal Circuits: Copper conductor, 300 volt insulation, rated 60 degree G, individual conductors twisted together [, shielded, J and covered with nonmetallic jacket; UL listed for use in air handling ducts, hollow spaces used as ducts, and plenums,

**2.6 CORDS**

- A. Description: Oil-resistant thermoset insulated multi-conductor flexible cord with identified equipment grounding conductor, suitable for [extra] hard usage in damp locations.

**2.7 WIRING DEVICES AND WALL PLATES**

- A. Wall Switch: TOGGLE
  - 1. AC general use, quiet-operating snap switch rated 20 amperes and 120-277 volts AC, with plastic toggle handle, color by owner from standard color selections.
- B. Receptacle: IVORY STANDARD
  - 1. Provide straight blade receptacles to NEMA WD 1.
    - a. Convenience Receptacle Configuration: Type 5-20 R, plastic face, color by owner from standard color selections.
- C. Wall Dimmers:
  - 1. Rotary dial type, ivory color, 1500 Watts minimum, sized to accommodate circuit load shown on contract drawings, equal these manufacturers Slater DAF-1500 or DAF-2000, Challenger 3575 or 3576, and Leviton 61500 or 62000.
- D. Decorative Cover Plate: match switch plate color in smooth nylon or high impact thermo-plastic.
- E. All receptacles installed outdoors in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted.

**2.8 SERVICE FITTINGS:**

- A. Recessed 3-Service floor Boxes: Equal Hubbel 3SFB-C for concrete or 3SFB-SS for wood construction with 1 duplex receptacle & 1 telephone/data plate, cable exit door & steel reinforced thermoplastic access door (verify color with owner / architect).
- B. Recessed Duplex Receptacle: Equal Hubbell S-3925 duplex or S-2525 single brass cover plate on cast e-type box set flush with finish floor surface.
- C. Receptacle Surface-type Service Fitting: One duplex configuration, satin aluminum housing, stainless steel device plate
- D. Communication Surface-type Outlet Service Fitting: one bushed 1" inside diameter opening configuration, satin aluminum housing, stainless steel device plate
- E. Surface Combination Fitting: One duplex convenience receptacle with one bushed 1" inside diameter opening configuration, satin aluminum housing, stainless steel device plate
- F. Poke-Through Service Fitting: Flush Type with integral flush box and cover., Fire Rating: 3 hours, One duplex and one communications outlet,
- G. Protective Ring: Brass or Aluminum finish,
- H. Split Nozzle: Brass or Aluminum finish.

- I. Carpet Ring: Brass or Thermo Plastic.

### PART 3 EXECUTION

#### 3.1 RACEWAY INSTALLATION

- A. Use only specified raceway in the following locations:
  1. Installations In or Under Concrete Slab, or Underground : Rigid steel conduit or Plastic conduit with steel ells. Provide concrete encasement where indicated or required.
  2. Exposed Outdoor Locations: Rigid steel conduit or intermediate metal conduit or Electrical metallic tubing. Use threaded or rain tight fittings.
  3. Wet Interior Locations: Rigid steel conduit or intermediate metal conduit or Electrical metallic tubing. Plastic conduit on special conditions & where prior approved by Architect/Engineer. Use threaded or rain tight fittings for metal conduit.
  4. Concealed Dry interior Locations: Rigid steel conduit or intermediate metal conduit. Electrical metallic tubing.
  5. Exposed Dry Interior Locations: Rigid steel conduit or intermediate metal conduit. Electrical metallic tubing.
  6. Motor Connections: Flexible Conduit for vibrating equipment, length to be 36" or less.
- B. Size raceways for conductor type installed or for type TRW conductors, whichever is larger.
  1. Minimum Size Conduit: 1/2-inch .
  2. Maximum Size Conduit in Slabs Above Grade: 3/4-inch, do not route conduits larger than 1/2-inch to cross each other.
- C. Use wire and cable in locations as follows:
  1. Concealed or Exposed interior Locations & Above Accessible Ceilings: Building wire in raceway(conduit) or Armored cable.
  2. Wet or Damp Interior Locations: Building wire in raceway.
  3. Exterior Locations: Building wire in raceways.
  4. Underground Locations: Building wire in raceway.
- D. Use no wire smaller than 12 AWG for power and lighting circuits, and no smaller than 14 AWG for control wiring, Use 10 AWG conductor for 20 ampere, 120 volt branch circuit home runs longer than 75 feet; and for 20 ampere, 277 volt branch circuit home runs longer than 200 feet.

#### 3.2 EXAMINATION AND PREPARATION

- A. Verify that supporting surfaces are ready to receive work.
- B. Verify that interior of building is physically protected from weather.
- C. Verify that mechanical work that is likely to injure conductors has been completed.
- D. Completely and thoroughly swab raceway system before installing conductors.
- E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned,
  - 1, Obtain verification from Owner of floor box locations, and locations of outlets in offices and work areas, prior to rough-in.

#### 3.3 INSTALLATION

- A. Perform Work according to NECA Standard of Installation.
- B. Arrange conduit to maintain headroom and to present neat appearance.
  1. Route exposed raceway parallel and perpendicular to walls and adjacent piping.
  2. Maintain minimum 6-inch clearance to piping and 12-inch clearance to heat surfaces such as flues, steam pipes, and heating appliances.
  3. Maintain required fire, acoustic, and vapor barrier rating when penetrating walls, floors, and ceilings.
  4. Route conduit through roof openings for piping and ductwork where possible; otherwise, route through roof jack with pitch pocket.
  5. Group in parallel runs where practical. Use rack constructed of steel channel- Maintain spacing between raceways or de-rate circuit ampacities to NFPA 70 requirements.
  6. Use conduit hangers and clamps; do not fasten with wire or perforated pipe straps.
  7. Use conduit bodies to make sharp changes in direction,
  8. Terminate conduit stubs with insulated bushings.
  9. Use suitable caps to protect installed raceway against entrance of dirt and moisture.

10. Provide No. 12 AWG insulated conductor or suitable pull string in empty raceways, except sleeves and nipples.
  11. Install expansion-deflection joints where raceway crosses building expansion or seismic joints.
  12. Install plastic conduit and tubing according to manufacturer's instructions,
- C. Install surface metal raceway and multi-outlet assemblies according to manufacturer's instructions.
1. Use flat-head screws or clips and straps suitable for the purpose, to fasten channel to surfaces. Mount plumb and level.
  2. Use suitable insulated bushings and inserts at connections to outlets and corner fittings in metal raceway.
  3. Use fittings and accessories designed for use with raceway system.
- D. Install auxiliary gutter and wire way according to manufacturer's instructions.
- E. Install electrical boxes as shown on the drawings, and as required for splices, taps, wire pulling, equipment connections and regulatory requirements,
1. Use cast outlet box in exterior locations and wet locations.
  2. Use hinged cover enclosure for interior pull and junction box larger than 12" in any dimension.
  3. Locate and install electrical boxes to allow access. Provide access panels if required.
  4. Locate and install electrical boxes to maintain headroom and to present neat mechanical appearance.
  5. Install pull boxes and junction boxes above accessible ceilings or in unfinished areas.
  6. Provide knockout closures for unused openings.
  7. Align wall-mounted outlet boxes for switches, thermostats, and similar devices.
  8. Coordinate mounting heights & locations of outlets above counters, benches, backsplashes, & at electric water coolers.
  9. Install lighting outlets to locate luminaries as shown on reflected ceiling plan.
- F. Use recessed outlet boxes in finished areas and where indicated.
1. Secure boxes to interior wall and partition studs, accurately positioning to allow for surface finish thickness.
  2. Use stamped steel stud bridges for flush outlets in hollow stud wall, and adjustable steel channel fasteners for flush ceiling outlet boxes.
  3. Locate boxes in masonry walls to require cutting corner only. Coordinate masonry cutting to achieve neat openings for boxes.
  4. Do not install boxes back-to-back in walls; provide 6 inches separation, minimum; except provide minimum 24 inches separation in acoustic-rated walls.
  5. Do not damage insulation.
- G. Install floor boxes according to manufacturer's instructions.
1. Set boxes level and flush with finish flooring material.
  2. Use cast floor boxes for installations in slab on grade,
- H. Install cable and wire according to manufacturer's instructions,
1. Neatly train and secure wiring inside boxes, equipment, and panelboards.
  2. Use wire pulling lubricant for pulling 4 AWG and larger wires.
  3. Support cables above accessible ceilings to keep them from resting on ceiling tiles,
  4. Make splices, taps, and terminations to carry full ampacities of conductors without perceptible temperature rise.
  5. Terminate spare conductors with electrical tape.
  6. Terminate aluminum wire according to manufacturer's instructions. Use tin-plated, aluminum bodied compression connectors. Fill with anti-oxidant compound prior to installation of conductor. Use suitable reducing connectors or mechanical connector adapters for connecting aluminum conductors to copper conductors.
- I. Install wiring devices according to manufacturer's instructions,
1. Install wall switches 42" above floor, OFF position down.
  2. Install wall dimmers 42" above floor. De-rate ganged dimmers as instructed by manufacturer. Do not use common neutral.
  3. Install convenience receptacles 18 " above floor, 6 " above counters, grounding pole on bottom.
  4. Install specific purpose receptacles at heights shown on Drawings.
  5. Install cord and attachment plug caps on equipment under the provisions of Section 16050. Size cord for connected load and rating of branch circuit over-current protection.

- J. Install wall plates flush and level.
  - 1. Install decorative plates on switch, receptacle, and blank outlets in finished areas,[ using jumbo size plates for outlets installed in masonry walls].
  - 2. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface-mounted outlets.
- K. Install service fittings according to manufacturer's instructions.
- L. Drill floor opening and install poke-through fittings according to manufacturer's instructions.
- M. Interface outlet box, service fitting &/or floor box installation with furniture furnished by owner.
- N. Provide & install wiring, in conduit for equipment & controls provided under other sections of these specifications including, but not limited to Plumbing & HVAC systems. Wiring systems in conduit include rough-in & connection for HVAC controls & thermostats as specified in Section 15600.
- O. Caulk around conduits that pass through smoke partitions, fire-rated assemblies, & corridor walls, using a non-combustible, permanently plastic, waterproof, non-staining compound which leaves a smooth finished appearance, or pack with non-combustible material to within 1/2" of both r faces, & provide the waterproof compound described above. See Division 07000 - Fire-stopping, for requirements & materials.

#### 3.04 FIELD QUALITY CONTROL

- A. Perform field inspection and testing of Electrical system,
  - 1. Inspect wire and cables for physical damage and proper connection.
  - 2. Torque test conductor connections and terminations to manufacturer's recommended values.
  - 3. Perform continuity test on all power and equipment branch circuit conductors. Verify proper phasing connections.
  - 4. Comply with 16050, 3.4

END OF SECTION



**SECTION 16400****SERVICE AND DISTRIBUTION****PART I GENERAL****1.1 SECTION INCLUDES**

- A. Section f 6050 - Electrical Materials & Methods
- B. Service entrance and metering.
- C. Enclosed switches,
- D. Grounding & Lighting Arresters.
- E. Transformers.
- F. Panelboards.
- G. Enclosed circuit breakers.
- H. Fuses.
- I. Motor starters.
- J. Contactors.

**1.2 SYSTEM DESCRIPTION**

- A. Electric Service System: See drawings for amperages, voltages, phases, & number of wires at 60 Hz.

**1.3 SUBMITTALS**

- A. Shop Drawings: Indicate relevant information on panelboards.
- B. Product Data: Provide data on enclosed switches and circuit breakers, fuses, circuit breakers, busway plug-in devices, transformers, motor starters, and contactors.
- C. Test Reports: Submit for field inspection and testing\_ Include description of procedures, duration, instruments used, and test values obtained. Present information in table comparing acceptable values to actual values.
- D. Operating and Maintenance Instructions: Panelboard NEMA PB 2.1.

**1.4 REGULATORY REQUIREMENTS**

- A. Conform to the requirements of Utility Company

**1.5 MAINTENANCE**

- A. Submit extra materials required for maintenance
  - 1. Provide two of each size of fuse.

**PART 2 PRODUCTS****2.1 METERING EQUIPMENT**

- A. Meter and CT's: By the local Power Company
- B. Meter Base, Conduits & Weatherheads by Electrical Contractor.

**2.2 ENCLOSED SWITCHES**

- A. Enclosed Switch Assemblies: NEMA KS 1; Type GD
  - 1. Fuse clips: Designed to accommodate Class R Fuses.
  - 2. Enclosures: NEMA KS 1; Type 1 or 3R as required.

**2.3 FUSES**

- A. Fuses 600 Amperes and Less: current limiting, one-time fuse, 250 or 600 volt, UL Class RK 1 or RK 5.
- B. Fuses Larger Than 600 Amperes: Current limiting, fast-acting one time fuse, 600 volt, UL Class L.
- C. Fuse Int errupting Rating: 200,000 rms amperes.

**2.4 GROUNDING MATERIALS**

- A. Ground Rods: Copper-encased steel, 3/4" diameter, minimum length 10'-0".
- B. Clamps: Bronze.

**2.5 PANELBOARDS**

- A. Equal these Manufacturers:
  - 1. Cutler-Hammer
  - 2. ITE
  - 3. Federal Pacific Electric
  - 4. Square 'D'
  - 5. C.E.
  - 6. Westinghouse
- B. Main and Distribution Panelboards: NEMA PB 1; circuit breaker type.
  - 1. Enclosure: Type 1 or Type 3R.
  - 2. Provide surface cabinet front with screw cover & lockable hinged door.
  - 3. Bus: Copper or Copper Clad Aluminum.
  - 4. Ground Bus: Copper.
  - 5. Voltage: as noted on drawings.
  - 6. Minimum Integrated Equipment Rating: 10,000 amperes rms symmetrical for 240 volt panelboards; 20,000 amperes rms symmetrical for 480 volt panelboards.
- C. Lighting and Appliance Branch Circuit Panelboards:
  - 1. NEMA PB 1; circuit breaker type.
  - 2. Enclosure: NEMA PB 1; Type 1 or Type 3R as required.
  - 3. Provide flush cabinet front with lockable door, keyed alike. Surface mounted cabinet allowed in electrical or mechanical rooms
  - 4. Bus: Copper or Copper Clad Aluminum bus.
  - 5. Ground Bus: Copper.
  - 6. Voltage: as noted on drawings.
  - 7. Minimum Integrated Equipment Rating: 10,000 amperes rms symmetrical for 240 volt panelboards.
- D. Accessories: Provide circuit breaker accessories as indicated on Drawings\_

**2.6 ENCLOSED CIRCUIT BREAKERS**

- A. Circuit Breaker: NEMA AB 1.
- B. Voltage: as shown on drawings to match equipment.
- C. Interrupting Rating: 10,000 amperes minimum.
- D. Enclosure: NEMA AB 1; Type 1 or 3R as required; steel.
- E. Accessories As indicated on Drawings.

**2.7 MOTOR STARTERS**

- A. Manual Motor Starter:
  - 1. NEMA ICS 2; AC general purpose Class A manually operated, full-voltage controller with overload relay, & push button operator.
  - 2. Fractional Horsepower Manual Starter: NEMA ICS 2; AC general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, & toggle operator.
  - 3. Enclosure: NEMA ICS 6; Type 1,
- B. Magnetic Motor Starter: NEMA ICS 2.
  - 1. Full Voltage Motor Starters: AC general-purpose Class A magnetic controller for induction motors rated in horsepower
  - 2. Two-Speed Starters: Include integral time delay transition between FAST and SLOW speeds,
  - 3. Coil Operating Voltage: as required for equipment.
  - 4. Extra Auxiliary Contacts: 2 normally open & field convertible.
  - 5. Control Power Transformers: 120 volt secondary.
  - 6. Enclosure: Type 1.
  - 7. Combination Motor Starters: Combine motor starters with molded case circuit breaker or fusible switch in single enclosure.

**2.8 CONTACTORS**

- A. General Purpose Contactors: NEMA ICS 2; mechanically or electrically held.
  - 1. Enclosure; NEMA ICS 6; Type 1.



2. Lighting Contactors: NEMA ICS 2; mechanically or electrically held.  
Enclosure: NEMA ICS 6; Type 1.
3. Provide bus terminals suitable for mounting in panelboard.

### 2.9 LIGHTING ARRESTERS

- A. Furnish & install lighting arrester(s) of proper voltage & phase in the main distribution equipment as required to protect the system.

## PART 3 EXECUTION

### 3.1 EXAMINATION AND PREPARATION

- A. Make arrangements with Utility Company to obtain permanent electric service to the Project.

### 3.2 INSTALLATION

- A. Install Utility services in accordance with Utility Company instructions. See riser diagram on drawing for service entrance type, size, location etc.
- B. Install equipment in accordance with manufacturer's instructions.
- C. Install proper fuses in each fused switch.
- D. Provide grounding and bonding to NFPA 70.
  1. Supplementary Grounding Electrode: Use driven ground rod on exterior of building.
  2. Provide for effectively grounding of metal frame of the building.
  3. Provide separate, insulated equipment grounding conductor in feeder and branch circuits.
  4. Terminate each end on a grounding lug, bus, or bushing.
  5. Provide grounding and bonding at Utility Company's metering equipment and pad-mounted transformer.
  6. Use 6 AWG minimum size, copper conductor to bond communications system grounding conductor to nearest effectively grounded metallic water pipe.
- E. Install panelboards and load centers to NEMA PB 1.1,
- F. Panelboards shall be field marked, per NEC 110.16, to warn qualified persons of potential electric arc flash hazards, The marking shall be located so as to be clearly visible to qualified persons before examination, adjustment, servicing, or maintenance of the equipment. Warning to be per NFPA 70E-2000, Electrical Safety Requirements for Employee Workplaces & ANSI Z535.4-1998, Product Safety Signs and Labels,

### 3.3 FIELD QUALITY CONTROL

- A. Inspect grounding and bonding system conductors and connections for tightness and proper installation.
- B. Measure ground resistance from system neutral connection at service entrance to convenient ground reference point by passing minimum current of 10 amperes DC and measuring voltage drop.
  1. Maximum resistance: 10 ohms.

### 3.4 CLEANING

- A. Clean equipment finishes to remove paint and concrete splatters.

END OF SECTION



**SECTION 16500****LIGHTING****PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Section 16050 - Electrical Basic Materials & Methods
- B. Luminaires and lampholders.
- C. Lamps,
- D. Ballasts,
- E. Exit Signs.
- F. Emergency lighting units.

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate construction details for Products which are not manufacturer's standard.
- B. Product Data: Provide product data for each Luminaire and lighting unit.
- C. Operating and Maintenance Instructions: Provide maintenance and operating instructions for battery powered lighting units.
  - 1. Provide (1) one onsite training session and (2) complete sets of written instructions for set up, operation and maintenance of all lighting equipment supplied on the project by a representative that is familiar with the use, setup and maintenance of the equipment.

**1.3 REGULATORY REQUIREMENTS**

- A. Conform to requirements of ANSI/NFPA 70.
- B. Conform to requirements at NFPA 101.
- C. Furnish products listed by Underwriters Laboratories, Inc. or other testing firm acceptable to authority having jurisdiction.

**1.4 MAINTENANCE**

- A. Provide two extra of each lamp installed.
- B. For future service & repair leave all opened remaining cartons I packages of lamps at project site to give to Owner.

**PART 2 PRODUCTS****2.1 LUMINAIRES AND LAMP HOLDERS**

- A. Luminaire Schedule: Product requirements for each luminaire and lampholder are specified in luminaire schedule on Drawings.
- B. Accessories: Provide required accessories for mounting and operation of each luminaire as indicated.
  - 1. Recessed Luminaires: Provide trim type suitable for ceiling system in which luminaire is installed.
  - 2. Thermal Protection: Provide thermal protection devices to meet NFPA 70 requirements.
  - 3. Surface Luminaires: Provide spacers and brackets required for mounting.
  - 4. Pendant Luminaires: Provide swivel hangers, pendant rods, tubes, and chains as indicated to install luminaire at appropriate height.

**2.2 EMERGENCY LIGHTING UNITS**

- A. Description: Self-contained emergency lighting unit 120 volt units or connected to emergency power circuit..
  - 1. If self-contained unit to have nickel-cadmium battery & Dual-rate battery charger with AC ON, RECHARGING; TEST switch indicators and controls,

**2.3 EXIT SIGNS**

- A. Construction:
  - 1. Housing: Extruded aluminum or thermal plastic as noted on schedule.
  - 2. Face: Aluminum stencil face with red or green letters as required by code.
  - 3. Directional Arrows: Universal type for field adjustment.
  - 4. Mounting: Universal, for field selection.
- B. Emergency Power Supply: Either emergency generator or an integral, listed for emergency lighting use nickel-cadmium battery with dual-rate battery charger having AC ON; TEST switch indicators and controls.

**2.4 LAMPS**

- A. Description:
  - 1. Incandescent Lamps: 125 volts, shape as scheduled.
  - 2. Fluorescent Lamps: Type and color as scheduled.
  - 3. Mercury Vapor HID Lamps: Deluxe white or Color improved.
  - 4. Metal Halide HID Lamps: Phosphor coated.
  - 5. High Pressure Sodium HID Lamps: Clear, suitable for ballast furnished in luminaire and for all burning positions.
  - 6. Reflector Lamp Beam Patterns: Conform to ANSI 078,379.

**2.5 FLUORESCENT BALLASTS**

- A. Provide fluorescent ballast suitable for use under installation conditions listed for each luminaire and lampholder.
  - 1. Voltage: As scheduled.
  - 2. Ballasts for nominal 430 mA lamps: Premium, Super-premium, or Electronic type as scheduled.

**2.6 ACCESSORIES**

- A. Provide Wall Brackets, Photo controls, Bolt Covers, Anchor Bolts, Hardware, etc. as required for a complete installation.

**PART 3 EXECUTION****3.1 EXAMINATION AND PREPARATION**

- A. Examine adjacent surfaces to determine that surfaces are ready to receive work.

**3.2 INSTALLATION**

- A. Install luminaires and accessories in accordance with manufacturer's instructions.
  - 1. Provide pendant accessory to mount suspended luminaires at height indicated,
  - 2. Support surface-mounted luminaires from ceiling grid tee structure; provide auxiliary support laid across top of ceiling tees. Fasten to prohibit movement.
  - 3. Install recessed luminaires to permit removal from below. Use plaster frames. Install grid clips in gymnasium & multipurpose spaces.
  - 4. Install lamps in luminaires and lampholders.

**3.3 ADJUSTING AND CLEANING**

- A. Align luminaires and clean lenses and diffusers at completion of work.
- B. Aim adjustable luminaires and lampholders as indicated or as directed.
- C. Adjust directional arrows on exit signs to meet approval of authority having jurisdiction.
- D. Clean paint splatters, dirt and debris from installed luminaires.
- E. Touch up luminaire finish at completion of work.
- F. Re-lamp luminaires which have failed lamps at completion of work.

END OF SECTION

**SECTION 16720****FIRE ALARM SYSTEM****PART 1 GENERAL****1.1 SECTION INCLUDES:**

- A. Section 16050: Basic Materials and Methods
- B. Fire alarm and smoke detection system
- C. Related Sections: 16100-400 Electrical

**1.2 SUBMITTALS**

- A. Shop Drawings: Indicate fire alarm and smoke detection system wiring diagrams.
- B. Product Data: Provide data on each fire alarm and smoke detection component.
- C. Provide a set digital pictures on a CD for the owners record of all under-slab and in wall work after inspection by the building inspector having jurisdiction over the project and before backfill and/or wall materials are installed. (applies to all work hidden and unable to view at projects completion)
  - 1. Supply pictures of the minimum quality listed below.
    - a. JPEG image, 5 mega pixel or better set to the largest format possible.
    - b. Image must clearly show all items that will be hidden from view when project is completed.
  - 2. Supply a legend for the pictures to clarify the date, location, direction and/or wall in which the picture was taken.
  - 3. Submittal of these pictures to be part of project closeout 16720, 3.4
- D. Operation and Maintenance Instructions: Provide (1) one onsite training session and complete written instructions, to the owner on the use, features and maintenance of the fire alarm and smoke detection system.
- E. Submit under provisions of Division 01000.

**1.3 REGULATORY REQUIREMENTS**

- A. Conform to NFPA 72 code for fire alarm and smoke detection systems. Certify inspection and approval from authority having jurisdiction.
- B. Conform to NFPA 101,

**1.4 MAINTENANCE**

- A. Submit extra materials required for maintenance; Two spare fire alarm station glass fronts

**1.5 QUALITY ASSURANCE**

- A. Each and all items of the Fire Alarm System shall be listed as a product of a SINGLE fire alarm system manufacturer under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment shall be listed under UL category UOJZ as a single control unit. Partial listing shall not be acceptable.
- B. In addition to the UL-UOJZ requirement mentioned above, the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC article 780-23.

**1.6 GENERAL**

- A. New Fire Alarm System with required control modules, wiring and equipment as required. The new system shall use closed loop initiating device circuits with individual zone and individual indicating appliance circuit supervision.
- B. Include manual pull stations, automatic fire detectors, horns, flashing lights, all wiring, connections to devices, outlet boxes, junction boxes, and all other necessary material for a complete operating system.
- C. All panels and peripheral devices shall be the standard product of a single manufacturer and shall display the manufacturer's name on each component.
- D. Equipment submissions must include a minimum of the following:
  - 1. Complete descriptive data indicating UL listing for all system components.
  - 2. Complete sequence of operations of the system.
  - 3. Complete system wiring diagrams for components capable of being connected to the system and interfaces to associated equipment.
  - 4. A copy of any state or local Fire Alarm System equipment approvals (if required by local jurisdiction).

**1.7 OPERATION**

- A. The system alarm operation subsequent to the alarm activation of any manual station or automatic detection device shall be as follows:
1. All audible alarm indicating appliances shall sound a pattern until silenced by the alarm silence switch at the control panel or the remove enunciator.
  2. All visual alarm indicating appliances shall display a pattern until extinguished by the Alarm Silence Switch.
  3. A supervised signal to notify the focal fire department or an approved central station shall be activated. To accommodate and facilitate job site changes, the type of 'city connection circuit' shall be on site configure-able to provide a "reverse polarity" connection.
  4. The associated initiating device circuit red LED shall (lash on the existing control panel until the alarm has been silenced at the control panel. Once silenced, this same LED shall latch on. A subsequent alarm received from another zone after silencing shall flash the subsequent zone alarm LED on the control panel. A pulsing alarm tone shall occur within the control panel and the remote enunciator until silenced.
- B. The alarm indicating appliances may be silenced after one (1) minute by authorized personnel upon entering the existing locked control cabinet and operating the alarm silence switch and the remove enunciator. A subsequent zone alarm shall reactivate the signals.
- C. The activation of any system smoke detector shall initiate an Alarm Verification operation whereby the panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system shall resume normal operation. The Alarm Verification shall operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately. The alarm verification operation shall be selectable by zone.
- D. Alarm and trouble conditions shall be immediately displayed on the control panel front without manual inquiry.

**1.8 SUPERVISION**

- A. All auxiliary manual controls shall be supervised so that all switches must be returned to the normal automatic position to clear system trouble.
- B. Each independently supervised circuit shall include a discrete amber "Trouble" LED to indicate disarrangement conditions per circuit.
- C. The System Expansion Modules connected by ribbon cables shall be supervised for module placement. Should a module become disconnected from the C.P.U. the system trouble indicator must illuminate and audible trouble signal must sound.
- D. Should a serial enunciator fail to communicate to the control panel for any reason, the system enunciator trouble indicator (LED) shall pulse a specific number of times at the control panel to indicate which enunciator has failed to communicate.

**1.9 POWER REQUIREMENTS**

- A. The existing control panel has 120 VAC power (with battery backup) via a dedicated fused disconnect circuit.
- B. All circuits requiring system operating power shall be 24 VDC and shall be individually fused at the control panel. Battery standby shall be 24 hours with 5 min of alarm, provide calculations to verify this requirements.

**PART 2 PRODUCTS****2.1 FIRE ALARM CONTROL PANEL**

- A. Where shown on the plans, provide and install to equal a Simplex 4005-Series Fire Alarm Control Panel. Construction shall be modular with solid state, microprocessor based electronics. All visual indicators shall be high contrast, LCD or LED type.
- B. The control panel shall contain the following features:
1. 2 Initiation Device Circuits (Addressable Points) (4005 = 8 zones)
  2. 2 Alarm indicating Appliance Circuits (Hard-Wired Input/output (I/O) Points)
  3. 1 Digital Alarm Communicating Transmitter.
  4. 1 Earth Ground Supervision Circuit
  5. 1 Basic minimum 5 Amp power supply
  6. 1 Automatic Battery Charger

7. 1 set Standby Batteries
8. 1 lot Resident non-volatile programmable operating system memory for all operating requirements
9. 1 Supervised Manual Evacuation Switch

## 2.2 MANUAL STATIONS

- A. Equal; Simplex type 4099 series double action and shall be constructed of high impact, red Lexan with raised white lettering and a smooth high gloss finish. To minimize nuisance alarms, activation shall require two separate and distinct actions. The first action shall require a glass front to be broken exposing the pull lever. The second action requires the operating lever to be pulled down. Once pulled down, the lever shall remain at a 90 degree angle from the front of the station to provide a visual indication of the station in alarm. Reset shall require a key common to the control panel and replacement of the glass window. Pull station shall be by the same manufacturer to insure compatibility.

## 2.3 SMOKE DETECTORS

- A. System Smoke Detectors: Furnish and install where indicated on the plans, to equal a Simplex 4098 series smoke detectors with 4098-series base.
- B. Detectors shall be listed to U.L. standard 268 and shall be documented compatible with the control equipment to which it is connected. Detector shall be listed for this purpose by Underwriters Laboratories, Inc. The detectors shall obtain their operating power from the fire alarm panel supervised detection loop. The operating voltage shall be 24 VDC (nominal). Removal of the detector head shall interrupt the supervisory circuit of the fire alarm detection loop and cause a trouble signal to be generated at the control panel.
- C. Each detector shall have a flashing status indicating LED for visual supervision. When the detector is actuated, the flashing LED will latch on steady and at full brilliance. The detector may be reset by actuating the control panel reset switch.
- D. To minimize nuisance alarms, voltage and RF transient suppression techniques shall be employed as well as a smoke verification circuit and an insect screen. The detector design shall provide full solid state construction and compatibility with other normally open fire alarm detection loop devices (heat detectors, pull stations, etc.). The detector head shall be easily disassembled to facilitate cleaning.

## 2.4 AUTOMATIC HEAT DETECTORS

- A. Automatic heat detectors shall be rate-of-rise & fixed-temperature type. When activated, the units shall be non-restorable and give visual evidence of such operation. Heat detectors equal Simplex type 4098 series (135 degrees F).

## 2.5 HORNS/STROBES

- A. Horns/Strobe to equal Simplex type 4903 series. The units shall be polarized and shall be operated by 24 VDC. Each assembly shall include separate wire leads for in/out wiring for each leg of the associated signal circuit. T-tapping of signal device conductors to signal circuit conductors shall NOT be accepted. The visible unit to be 110 Candela-Second Xenon flash & horn to be 87dB @ 10 feet. The white Lexan lens shall have the work 'FIRE' in red lettering.

## 2.6 VISUAL LAMPS

- A. Visual indicating appliances equal Simplex type 4904 series. The lamp assembly shall incorporate a built-in reflector for more efficient light propagation and a special shock-mounting arrangement to resist bulb failure due to vibration. Lamp shall provide 4 wire connection to insure properly supervised in/out system connection. These units shall be U.L. listed and capable of either ceiling or wall mounting. The unit shall be complete with a temper resistant, pyramidal shaped Lexan lens with "Fire" lettering visible on front. Visual units shall be 110 Candela-Second Xenon flash output to meet ADA requirements.

## 2.7 NOT USED

## 2.8 NOT USED

## 2.9 WIRE/CABLE

- A. Non-power limited fire-protective signaling cable, copper conductor, 150 volt insulation rating 60°C.
- B. Power limited fire-protective signaling cable, copper conductor, 300 volt insulation rating 105°C.

**PART 3 EXECUTION****3.1 INSTALLATION**

- A. Provide and install the system in accordance with the plans and specifications all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC Article 760 A and C, Power Limited Fire Protective Signaling Circuits or if required, may be reclassified as no-power limited and wired in accordance with NEC Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor. All junction boxes shall be sprayed red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.
- B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate sub-contractors,
- C. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.
- D. The manufacturer's authorized representative shall provide on-site supervision of installation.
- E. Install fire and smoke detection alarm system in accordance with manufacturer's instructions,
  - 1. Install manual station with operating handle 42" above floor & audible and visual signal devices 7'-3" above floor.
  - 2. Install fire alarm system wiring in conduit in concealed locations,
  - 3. Mount end-of-line device in box with last device or separate box adjacent to last device in circuit.
  - 4. Make conduit and wiring connections to duct smoke detectors.
  - 5. The system shall use closed loop initiating device circuits and be wired as such.
- F. All conduit, conduit fittings, pull boxes, junction boxes, 120V AC circuits and system ground cable shall be provided and installed by electrical contractor under Section 16110 - Raceway Systems.
- G. Racks, back boxes, etc, which are not standard rough-in items shall be provided by fire alarm contractor and installed by electrical contractor as part of rough-in.
- H. Provide for & coordinate with other contractors for the connection of their systems to fire alarm system. This may include, but not limited to sprinkler system flow & tamper switches, elevator capture, HVAC equipment shut-down & damper controls, telephone city tie, & fire pump controls.

**3.4 PROJECT CLOSE OUT**

- A.. Upon completion of fire alarm installation and before final payment is made, the fire alarm contractor will provide to the owner (2) two completed sets of as-built drawings detailing and showing any deviation from the contract documents, submittals(if different from original submittal), and any instruction/maintenance manuals supplied by manufacturer with equipment used on the project.
  - 1. It will be the responsibility of the fire alarm contractor to provide all of the above from any sub-contractor that competes any work on the project under their contract.

END OF SECTION