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Architecture, Interior Design & Planning

## Project Manual

# Pascagoula-Gautier School District

## Gautier Elementary School Kitchen Renovation (RE-BID)

*505 Magnolia Tree Drive  
Gautier, MS 39553*

Project No. 22050.01

08/07/2023

**Set Number**

Architect's Seal





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505 MAGNOLIA TREE DRIVE  
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PROJECT NO. 22050.01**

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**SECTION 001113 - ADVERTISEMENT FOR BIDS**

Notice is hereby given that sealed hard copy bids or electronic bids will be received for the project named below by the **Pascagoula-Gautier School District, 1006 Communy Avenue, Pascagoula, MS 39568** until **2:00 PM** on **September 8, 2023**. Bids may be submitted directly to the location listed below or electronically through the Electronic Bidding System as listed below:

Location for Receipt of Sealed Hard Copy Bids:

**Central Office (Instructional-Administrative Services Center)  
Pascagoula-Gautier School District  
1006 Communy Avenue  
Pascagoula, MS 39568**

Location for Receipt of Electronic Bids:

**Access the following website and log in: [www.pgsgbids.com](http://www.pgsgbids.com).  
Access the Public Jobs link, access the Project link, and access the Submit Bid tab.**

Plans and Specifications Entitled:

**Pascagoula-Gautier School District  
Gautier Elementary School Kitchen Renovation (RE-BID)  
505 Magnolia Tree Drive  
Gautier, MS 39553**

May be inspected at the office of the Architect named below, or may be obtained from the Architect as set out below:

Qualified Prime (General) Contractors, Subcontractors, and Material Suppliers are required to register and order bid documents at [www.jbhmplans.com](http://www.jbhmplans.com).

Bid documents are available as paper prints or as digital copies on CD. Cost of CD (.pdf Format) and/or the cost of paper prints will be listed on the [www.jbhmplans.com](http://www.jbhmplans.com) website. Bid documents are non-refundable and must be purchased through the website.

Questions regarding website registration and online orders please contact our web support line at (662) 407-0193.

All plan holders are required to have a valid email address for registration.

Partial sets will not be issued.

Proposals submitted in hard copy shall be submitted in duplicate only upon the blank proposal forms provided with the specifications and must be accompanied by Proposal Security in the

form of Certified Check or acceptable Bid Bond in the amount equal to at least five percent (5%) of the Base Bid. Proposals submitted electronically shall be completed upon the blank proposal form provided with the specifications, and uploaded in .PDF format as directed by the Electronic Bidding System. Proposal Security shall also be uploaded in .PDF format to accompany bids submitted electronically. If an electronic bid is submitted, an original hard copy of all Proposal Documents, including Proposal Security, shall be provided to the Architect within three (3) business days after bid receipt, if requested. In either case, such security to be forfeited as liquidated damages, not penalty, by any bidder who fails to carry out the terms of the proposal, execute contract and post Performance Bond in the form and amount within the time specified. The Bid Bond, if used, shall be payable to the Owner.

Bids on the Project must be received on or before the period scheduled for the Project and no bid withdrawn after the scheduled closing time for the Project for a period of sixty (60) days.

All bids submitted in excess of \$50,000.00 by a Prime or Subcontractor to do any erection, building, construction, repair, maintenance, or related work must comply with the Mississippi Contractors Act of 1985, by securing a Certificate of Responsibility from the State Board of Contractors. Each bid, exceeding \$5,000.00, must be accompanied by the Bidder's certified check or a bid bond, duly executed by the Bidder as principal and having surety thereon, a surety company approved by the Owner and signed by an agent, regularly commissioned and licensed to transact business in Mississippi, in the amount of five percent of the bid. All bid bonds must be accompanied by the appropriate Power of Attorney. No Power of Attorney is necessary with a certified check.

The Owner reserves the right to reject any and all bids on any or all projects and to waive informalities.

OWNER:

**Pascagoula-Gautier School District  
1006 Communy Avenue  
Pascagoula, MS 39568**

ARCHITECT:

**JBHM Architects, P.A.  
308 East Pearl Street, Suite 300  
Jackson, MS 39201  
PH: (601) 352-2699**

DATES OF ADVERTISEMENT: August 7, 2023  
August 14, 2023

END OF SECTION **001113**



## SECTION 002113 - INSTRUCTIONS TO BIDDERS

### PART 1 - GENERAL

#### 1.01 GENERAL REQUIREMENTS

- A. Interpretations: Should a bidder find discrepancies in or omissions from the plans and specifications or be in doubt as to their written meaning, he should immediately notify the Architect in writing. The Architect will then send a written instruction or interpretation to all known holders of the documents if deemed appropriate by the Architect. Neither the Owner nor the Architect will be responsible for nor bound by any oral instructions or for a bidder's failure to make inquiry.
- B. Addenda: Any addenda to the plans and/or specifications issued before or during the time of bidding will become a part of the Contract and receipt of same must be acknowledged by Bidder in his proposal.
- C. "Or Equal" Substitutions: Refer to Section 002213, Paragraphs 3.4.2 and 3.4.4 and to Section 012500 - "Or Equal" Substitutions: Bidder is advised that some sections of the specifications may not allow for substitutions and that the requirements of Sections 002213 and 012500 must be strictly complied with to obtain a substitution where substitution is allowed. Failure to strictly comply with Sections 002213 and 012500 and any requirements in the technical specifications which do not conflict with and which are in addition to Sections 002213 and 012500 may, in the Owner's sole discretion, result in the rejection of the request for "or equal" substitution.
- D. Construction Documents: As indicated in the Advertisement for Bids, Contract Documents will be issued on CD only. Bidders should include in Base Bid Proposal cost of printing all documents required for construction, as-built drawings, and close out documents.

#### 1.02 BIDDING

- A. Contract for Construction: Lump sum, single bid received from General Contractors and shall include General, Mechanical, Electrical, and Sitework as well as all other work shown on plans and specified herein.
- B. Subcontractors and Suppliers: The Bidder is specifically advised that any person, firm, or other party to whom it is proposed to award a Subcontract or Purchase Order under this Contract must be acceptable to the Owner.
  - 1. The Owner may make such investigation as he deems necessary to determine the ability of the Bidder or subcontractors or suppliers to perform the work, and the Bidder shall furnish to the Owner all such information and data for this purpose as the Owner may request. The

Owner reserves the right to reject any bid if the evidence submitted by, or investigation of, such Bidder fails to satisfy the Owner that such Bidder is properly qualified to carry out the obligations of the Contract and to complete the work contemplated therein within the time required.

2. All subcontractors must have a current, valid, Contractor's License and/or Certificate of Responsibility where Bid exceeds \$50,000.00.
3. Listing of Subcontractors and Suppliers:
  - a. So that the Owner may be assured that only qualified and competent subcontractors and suppliers will be utilized on the Project and to prevent "bid-shopping" and/or "bid-chopping", each Bidder shall identify within seven (7) days after Bid receipt date the name of the subcontractor and supplier used by the Bidder in his bid for each subcontractor and supplier whose bid or quote exceeds \$50,000.00. Bidder's List shall be provided on the Listing Form provided with the Proposal Form. A Bidder's failure to indicate the name(s) of the subcontractors and major suppliers included in his lump sum price within seven (7) days after Bid receipt may result in the rejection of the Bidder's bid as nonresponsive.
  - b. The successful Bidder shall use the subcontractor and supplier identified by him as being included in his lump sum price, provided however, the Bidder assumes the risk that the subcontractor or supplier listed within the seven (7) day period will be acceptable to the Owner and the Architect. The Bidder shall not substitute another subcontractor for the listed subcontractor or supplier unless agreed to in writing by the Owner.
  - c. If Bidder lists itself as a supplier for any of the classifications listed, then the Bidder will be required to furnish such product from its manufacturing inventory and to demonstrate to the Owner and Architect that it has satisfactory qualifications and prior experience manufacturing and furnishing such materials, equipment and/or products. If Bidder lists itself as a subcontractor for any of the classifications listed, then the Bidder will be required to perform the work with its own regularly employed personnel and to demonstrate to the Owner and Architect that it has satisfactory qualifications and prior experience performing such work with its own regularly employed personnel. The Owner reserves the right to reject any bid if the evidence submitted by Bidder fails to satisfy the Owner that the Bidder has satisfactory qualifications and prior experience performing such work and/or furnishing such materials, equipment and/or products.

### 1.03 CERTIFICATE OF RESPONSIBILITY

- A. Each Bidder submitting a bid equal to or in excess of \$50,000.00 on public or private projects must show on his bid and on the face of the envelope containing the bid, his Certificate of Responsibility Number, as required by Section 31-3-21 (latest revision) Mississippi Code. If the bid does not exceed \$50,000.00, a notation so stating must appear on the face of the envelope.
- B. Each subcontractor shall also have a Certificate of Responsibility Number, as required by Section 31-3-21 (latest revision), Mississippi Code.
- C. Evidence: No bid will be opened, considered or accepted unless the above information is given as specified. Sufficient evidence that said Certificate of Responsibility has been issued and is in effect at the time of receiving bids must be submitted if required by the Owner or the Architect. Likewise, it shall be the responsibility of the General Contractor to require a Certificate of Responsibility Number from any subcontractor that falls in the category of "B" above.
- D. In accordance with Mississippi law, if the Bidder is a joint venture, either the joint venture or all of the Contractors which make up the joint venture must hold certificates of responsibility from the State Board of Contractors.

### 1.04 PRE-BID CONFERENCE

- A. A pre-bid conference will not be held. Bidders can schedule a site tour of the project site at their convenience.
- B. All general contract/major subcontract Bidders and Suppliers are urged to attend.
- C. All Bidders are expected to have familiarized themselves with conditions relating to the Work prior to the pre-bid conference.

### 1.05 NON-RESIDENT CONTRACTOR

- A. When a non-resident Contractor submits a bid for a Mississippi public project, he shall include with bid a copy of his resident State's current law pertaining to such State's treatment of non-resident Contractors as required by Section 31-3-21, Mississippi Code, (latest revisions) or a letter stating that his resident State has no such law pertaining to such State's treatment of non-resident contractors.

### 1.06 BID SECURITY

- A. Each bid, exceeding \$5,000.00, must be accompanied by the Bidder's certified check or a bid bond, duly executed by the Bidder as principal and having surety thereon, a surety company approved by the Owner and **signed by an agent, regularly commissioned and licensed to transact business in Mississippi**, in the amount of five percent of the bid. All bid bonds must be accompanied by the appropriate Power of Attorney designating the Mississippi Resident Agent.

## 1.07 OPENING OF PROPOSALS

- A. Refer to the Advertisement for Bids.

## 1.08 PREPARATION OF BID

- A. **Conditions of Work:** Each Bidder must fully inform himself of the conditions relating to the construction of the project and employment of labor thereon. Failure to do so will not relieve a successful Bidder of his obligation to furnish all material and labor necessary to carry out the provisions of his Contract. The Contractor must employ methods or means to cause no interruptions of or interference with the work of any other Contractor.
- B. **Examination of Site:** All Bidders, including the general contractor and subcontractors, will visit the site of the building, and inform themselves of all conditions. Failure to visit the site will in no way relieve the successful Bidder from his obligation to complete all work in accordance with the Contract Documents without additional cost to the Owner.
- C. **Staging and Access:** All Bidders, including the general contractor and subcontractors, acknowledge that the construction premises are restricted and that access is affected by the location of the Project, by the Facilities surrounding the Project and by other construction either presently being performed or proposed to be performed during the performance of this Contract. All Bidders, including the general contractor and subcontractors, further acknowledge that such limitations in space and accessibility have been taken into account in estimating their bids.
- D. **Laws and Regulations:** The Bidder's attention is directed to the fact that all applicable state laws, municipal ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the project apply to the Contract. The successful Bidder shall be required to comply with all applicable laws, ordinances, rules and regulations at no additional cost to Owner whether such laws, ordinances, rules and/or regulations are enacted or adopted or become effective before or after bid opening.
- E. **Obligation of Bidder:** At the time of opening of bids, Bidder will be presumed to have inspected the site and to have read and be thoroughly familiar with the plans and specifications, including all addenda.
- F. **Telegraphic and Facsimile Modifications:** A Bidder may modify his bid by telegraphic or facsimile communication at any time, provided such communication is received by the Owner prior to the scheduled time for opening bids. Written confirmation must be received within two days from the bid opening time or no consideration will be given the telegraphic or facsimile modifications.

## 1.09 PROPOSALS

- A. Form: Submit all proposals on forms provided and fill all applicable blank spaces without interlineation, alteration, or erasure and recapitulations of the work to be done. No oral, telegraphic, or telephonic proposals will be considered. Any addenda issued during the bidding must be noted on the Proposal Form.
- B. Withdrawal: Any bid may be withdrawn prior to the time for opening of bids or authorized postponement thereof. Any bid received after the time and date specified will not be considered. All bids are irrevocable offers to contract at the price bid which may not be withdrawn until sixty (60) days after bid opening.
- C. Submittal: Submit bids in duplicate in an opaque sealed envelope bearing on the outside, the name and Certificate of Responsibility number of the Bidder, his address, bid opening date, time, complete project name, and project number.
- D. Any bid modification or qualification on the outside of the envelope will be considered only if accompanied by signature and title of person making the modification.
- E. Mailing: If forwarded by mail, the sealed envelope containing the bid must be enclosed in another envelope addressed to:

**Central Office (Instructional-Administrative Services Center)  
Pascagoula-Gautier School District  
1006 Communy Avenue / Post Office Box 250  
Pascagoula, MS 39568**

- F. Bidders are urged to deliver their bid to the Owner. Owner will not be responsible for misdelivery of mail or express deliveries.

## 1.10 CONTRACT

- A. Award of Contract: Award shall be made to the lowest and best Bidder, pursuant to Mississippi law and these Instructions to Bidders. The lowest bid shall be the base bid or combination of base bid and those alternates which produce a total within available funds. The Owner reserves the right to waive irregularities and to reject any and all bids.
- B. Evaluation of the lowest and best Bidder, pursuant to Mississippi law and these Instructions to Bidders, will include but not be limited to the following:
  - 1. The submitted bid price.
  - 2. The Bidder's relevant experience with Public and/or School projects of similar size, complexity, cost, and schedule constraints. To facilitate this evaluation, each bidder shall include with their Proposal a list of projects completed within the last five (5) years that are similar to this project in size, complexity, cost, and schedule constraints. Include no less than the following information:
    - a. Name of the project

- b. Owner's name and contact information
    - c. Contract original sum and final contract amount
    - d. Contract original substantial completion date and actual substantial completion date
    - e. Indicate if there were any claims, liquidated damages imposed, etc.
  3. The Bidder's proposed Project Manager's relevant experience with Public and/or School projects of similar size, complexity, cost, and schedule constraints. To facilitate this evaluation, each bidder shall include with their Proposal a resume of the Proposed Project Manager.
  4. The Bidder's proposed Superintendent's (on-site foreman's) relevant experience with Public and/or School projects of similar size, complexity, cost, and schedule constraints. To facilitate this evaluation, each bidder shall include with their Proposal a resume of the Proposed Project Superintendent.
- C. Disqualification of Bidder: The Owner reserves the right to award to other than the low Bidder when, in the Owner's judgment, it is in his best interest to do so. The Owner reserves the right to request information from prospective Bidders as necessary in order to determine if circumstances for disqualification exist. For instance, a Bidder may be disqualified for such reasons as:
  1. Bidder being in arrears on existing contracts.
  2. Bidder being in litigation with the Owner or the institution/agency.
  3. Bidder having defaulted on or failed to satisfactorily complete a previous contract with the Owner, including Bidder's failure to satisfactorily fulfill the warranty obligations of a previous contract with the Owner.
  4. The above is not an inclusive list.
- D. Security for Faithful Performance: When the bid exceeds \$5,000.00 and simultaneously with his delivery of the executed Contract, the Contractor will furnish a payment and a performance bond in accordance with Section 31-5-51 et. seq. of the Mississippi Code (latest revision). The surety on such bonds will be a duly authorized surety company licensed to do business in the state of Mississippi which is acceptable to the Owner and which is listed on the United States' Treasury Department's list of acceptable sureties.
- E. Time of Completion: By submission of its bid, Bidder agrees to commence work on or before a date specified in a written "Notice to Proceed" and to fully complete the Project within the time stated in the Bid Proposal Form.
- F. Liquidated Damages for Failure to Enter Into Contract: The successful Bidder, upon his failure or refusal to execute and deliver the Contract and required bonds within ten days after he has received notice of the acceptance of his bid, will forfeit to the Owner as liquidated damages the security deposited with his bid.
- G. Liquidated Damages for Failure to Substantially Complete Project in Time Stipulated: Applicable when stipulated sum is shown in Section 002213, Paragraph 9.11.

1.11 BID DOCUMENTS

- A. Plans and Specifications are available, unless noted otherwise on the Advertisement for Bid, at the office of the Architect, JBHM Architects, P.A., 308 East Pearl Street, Suite 300, Jackson, MS 39201.
- B. No partial sets of documents will be issued or accepted for return.

END OF SECTION **002113**





**SECTION 002213 - SUPPLEMENTARY CONDITIONS**

**PART 1 GENERAL**

**1.1 DESCRIPTION**

- A. The following Supplementary Conditions modify the "General Conditions of the Contract for Construction," AIA Document A201, 2017. Where a portion of the General Conditions is modified or deleted by the Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect. In the event of a conflict between the General Conditions of the Contract for Construction and Section 002213, Section 002213 shall control even if the conflicting provision in the General Conditions of the Contract for Construction is not expressly revised or deleted by reference in Section 002213.
- B. The General Conditions may also be supplemented or amplified elsewhere in the Contract Documents by provisions located in, but not necessarily limited to, Division 1 of the Specifications.

**1.2 SUPPLEMENTS**

**ARTICLE 1 - GENERAL PROVISIONS**

**1.1 BASIC DEFINITIONS**

**1.1.1 THE CONTRACT DOCUMENTS:**

Delete the last sentence in Article 1.1.1 and insert the following:

The Contract Documents shall include the Instructions to Bidders, the plans, the specifications, including Divisions 0 through 16, all Addenda and modifications to the plans and/or specifications, the Agreement between Owner and Contractor, the performance and payment bonds, the notice to proceed and any executed change orders. Information and documentation pertaining to soil investigation data, laboratory investigations, soil borings and related information included herein are not part of the Contract Documents. In the event of a conflict between the provisions of Division 0 and any other section of the Contract Documents, such other sections(s) shall govern.

**1.1.2 THE CONTRACT**

Add the following to the end of Article 1.1.2:

Large scale drawings shall govern over small scale drawings where there are differences or conflicts between such drawings. Where the word "similar" appears on the plans, it shall not be interpreted to mean "identical" and shall require the Contractor to coordinate the actual conditions and dimensions of the location where the "similar" conditions are shown to occur.

**1.1.9 MISCELLANEOUS DEFINITIONS**

Add the following:

The term "products" as used in these Supplementary Conditions includes materials, systems and equipment.

## 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

### 1.2.4 Add the following Article 1.2.4:

It is the intent of the Contract Documents that the Contractor shall properly execute and complete the Work described by the Contract Documents, and unless otherwise provided in the Contract, the Contractor shall provide all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services, whether temporary or permanent and whether or not incorporated in the Work, in full accordance with the Contract Documents and reasonably inferable from them as necessary to produce the intended results.

### 1.2.5 Add the following Article 1.2.5:

The Contract Documents shall be interpreted collectively, each part complementing the others and consistent with the intent of the Contract Documents. Unless an item shown or described in the Contract Documents is specifically identified to be furnished or installed by the Owner or others or is identified as "Not In Contract" ("N.I.C."), the Contractor's obligation relative to that item shall be interpreted to include furnishing, assembling, installing, finishing, and/or connecting the item at the Contractor's expense to produce a product or system that is complete, appropriately tested, and in operable condition ready for use or subsequent construction or operation by the Owner or separate contractors. The omission of words or phrases for brevity of the Contract Documents, the inadvertent omission of words or phrases, or obvious typographical or written errors shall not defeat such interpretation as long as it is reasonably inferable from the Contract Documents as a whole.

Words or phrases used in the Contract Documents which have well-known technical or construction industry meanings are to be interpreted consistent with such recognized meanings unless otherwise indicated.

Except as noted otherwise, references to standard specifications or publications of associations, bureaus, or organizations shall mean the latest edition of the referenced standard specification or publication as of the date of the Advertisement of Bids.

In the case of inconsistency between Drawings and Specifications or within either document not clarified by addendum, the better quality or greater quantity of Work shall be provided in accordance with the Architect's interpretation.

Generally, portions of the Contract Documents written in longhand take precedence over typed portions, and typed portions take precedence over printed portions.

Any doubt as to the meaning of the Contract Documents or any obscurity as to the wording of them, shall be promptly submitted in writing to the Architect for written interpretation, explanation, or clarification.

### 1.7 BUILDING INFORMATION MODELS USE AND RELIANCE – Delete this Article 1.7 entirely.

ARTICLE 2 - OWNER

2.2 EVIDENCE OF THE OWNER’S FINANCIAL ARRANGEMENTS

2.2.1 Add the following to the beginning of Article 2.2.1:

“If the Project is a private project, not funded by public funds, then . . .”.

2.2.2 Delete Article 2.2.2 entirely.

2.3 INFORMATION AND SERVICES REQUIRED OF THE OWNER

2.3.1 Delete Article 2.3.1 in its entirety.

2.3.4 Delete Article 2.3.4 in its entirety.

2.3.6 Delete Article 2.3.6 in its entirety and insert the following:

As indicated in the Advertisement for Bids, Contract Documents will be issued via hard copy and / or CD. Bidders should include in their Base Bid Proposal, the cost of printing all documents required for construction, as-built drawings, and close out documents.

2.4 OWNER’S RIGHT TO STOP THE WORK

2.4 Delete Article 2.4 in its entirety and insert the following:

2.4 If the Contractor fails to correct Work which is not in accordance with the requirements of the Contract Documents as required by Article 12.2 or fails to carry out Work in accordance with the Contract Documents or fails to perform any of its obligations under 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 Article 6.1.3.

The rights and remedies under this Article 2.4 are in addition to and do not in any respect limit any other rights of the Owner, including its termination rights under Article 14.

ARTICLE 3 - CONTRACTOR

3.1 GENERAL

3.1.1 Add the following at the end of Article 3.1.1:

The relationship of Contractor to Owner shall be that of independent contractor, and nothing in the Contract Documents is intended to nor should it be construed as creating any other relationship, expressed or implied, between Owner and Contractor.

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

#### 3.2.5 Add the following Article 3.2.5:

The Owner is entitled to deduct from the Contractor's pay applications for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Contractor from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

### 3.4 LABOR AND MATERIALS

#### 3.4.2 Add the following to the end of Article 3.4.2:

Some Sections of the Specifications may not allow substitution of materials, products or equipment. Where substitution is allowed the request for substitution will only be considered if made in strict accordance with the requirements of Article 3.4.4 below and Section 01630.

#### 3.4.4 Add the following Article 3.4.4:

After the Contract has been executed, the Owner and the Architect may consider a request for the substitution of products in place of those specified only under the conditions set forth in Section 01630 of the specifications.

By making requests for substitutions, the Contractor:

- .1 Represents that the Contractor has personally investigated the proposed substitute product and determined that it is equal or superior in all respect to that specified;
- .2 Represents that the Contractor will provide the same warranty for the substitution that the Contractor would for that specified;
- .3 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 becomes apparent; and
- .4 Shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects at its costs.

All substitutions shall be submitted within 30 days of the Notice to Proceed, as per Section 01630.

#### 3.4.5 Add the following Article 3.4.5:

Contractor represents that it has independently investigated, considered and understands the labor conditions in the area surrounding the Project and acknowledges that such conditions may impact the Contractor's cost and/or time of performance of the Contract. Therefore, Contractor further represents that the

Contract Price is based upon Contractor's independent investigations into such labor conditions and that the Contract time is reasonable, and the date of Substantial Completion is obtainable. As a result, Contractor assumes the risk of increased costs, if any, incurred by it arising out of or related to such labor conditions and acknowledges that Contractor and its surety will reimburse Owner for any additional costs Owner incurs arising out of or related to such labor conditions.

### 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

#### 3.7.1 Delete Article 3.7.1 in its entirety and insert the following:

The Contractor shall secure and pay for the building permit and all other permits, fees, licenses, inspections and all other approvals and charges necessary for proper execution and completion of the Work.

#### 3.7.3 Delete the words "knowing it to be" from Article 3.7.3.

#### 3.8.2.3 Add the following to the end of Article 3.8.2.3:

. . . except when installation is specified to be included as part of the allowance in the General Requirements (Division 1 of the Specifications).

### 3.9 SUPERINTENDENT

Add the following to the end of Article 3.9.1:

The Contractor shall also employ a competent project manager who shall be primarily responsible for the Contractor's home office activities in connection with the Contract.

The Owner shall have the right, which shall be exercised in a reasonable fashion, to approve the project manager and/or superintendent employed by the Contractor, either before or during the progress of construction.

The superintendent and project manager for the project shall be designated by the Contractor at the pre-construction conference. After Owner's approval of such project manager and superintendent, they shall not be replaced by the Contractor without the Owner's prior written consent, which consent is required unless the Contractor submits proof satisfactory to the Owner that the superintendent and/or the project manager should be terminated by the Contractor for cause.

### 3.10 CONTRACTOR'S CONSTRUCTION AND SUBMITTAL SCHEDULES

#### 3.10.1 Add "but, in any event, no less than submission of a revised schedule with each monthly application for payment pursuant to Section 9.3" between "intervals" and "as" in the fourth sentence.

#### 3.10.3 Delete Article 3.10.3 in its entirety and insert the following:

Time being of the essence, the Contractor shall perform the Work in accordance with the most recent schedule submitted to and approved by the Owner and Architect.

3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

3.12.6 Add the following to the end of Article 3.12.6:

In reviewing Shop Drawings, Product Data, Samples and similar submittals the Architect shall be entitled to rely upon the Contractor's representation that such information is correct and accurate.

3.12.8 Add the following to the end of Article 3.12.8:

Unless such written notice has been given, the Architect's approval of a Shop Drawing, Product Data, Sample or similar submittal shall not constitute approval of any changes not requested on the prior submittal.

3.12.9 Add the following to the end of Article 3.12.9:

The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional resubmittals.

3.12.10.1 Delete the second sentence entirely and replace with: "The performance and design criteria specified by the Architect in the Contract Documents shall be prepared in accordance with the applicable standard of care."

3.18 INDEMNIFICATION

3.18.1 Add the word "defend," before the word "indemnify" in the first line, add the words "or Nonperformance" after the word "performance" in the third line and delete the phrase which begins "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)," to the end of the sentence.

ARTICLE 4 - ARCHITECT

4.2 ADMINISTRATION OF THE CONTRACT

4.2.4 Delete the last sentence entirely.

4.2.10 Delete Article 4.2.10 in its entirety.

ARTICLE 5 - SUBCONTRACTORS

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

5.2.1 Delete the phrase "Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract" from the first sentence of Article 5.2.1 and insert the following in lieu thereof:

“The Contractor, with its first Application for Payment and as a condition to the Owner’s obligation to make payments to Contractor under Article 9 of the General Conditions as supplemented herein,”

5.2.5 Add the following Article 5.2.5:

The Contractor’s unauthorized substitution of any subcontractor, supplier, person or entity previously identified by Contractor in accordance with Article 5.2.1 shall entitle the Owner to reject the work, materials or product furnished and require removal and replacement at no additional cost to the Owner.

ARTICLE 6 - CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

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

Delete Articles 6.1.1, 6.1.2, 6.1.3, 6.1.4 in their entirety and insert the following:

6.1 The term “Separate Contractor(s)” shall mean other contractors retained by the Owner under separate agreements. 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 either in connection with other portions of the Project or other construction or operation on the site. In such event, the Contractor shall coordinate its activities with those of the Owner and of Separate Contractors so as to facilitate the general progress of all work being performed by all parties. Cooperation will be required in the arrangement for the storage of materials, and in the detailed execution of the Work.

The Contractor, including his subcontractors, shall keep informed of the progress and the detailed work of the Owner or Separate Contractors and shall immediately notify the Architect of lack of progress or delays by Separate Contractors which are affecting Contractor’s Work. Failure of Contractor to keep informed of the progress of the work of the Owner or Separate Contractors and/or failure of Contractor to give notice of lack of progress or delays by the Owner or Separate Contractors shall be deemed to be acceptance by Contractor of the status of progress by Separate Contractors for the proper coordination and completion of Contractor’s Work. If, through acts or neglect on the part of the Contractor, the Owner or any Separate Contractors shall suffer loss or damage or assert any claims of whatever nature against the Owner, the Contractor shall defend, indemnify and hold harmless the Owner from any such claims or alleged damages, and the Contractor shall resolve such alleged damages or claims directly with the Separate Contractors.

6.2 MUTUAL RESPONSIBILITY

6.2.3 Delete Article 6.2.3 in its entirety.

ARTICLE 7 - CHANGES IN THE WORK

7.1 GENERAL

7.1.3 Add the following to the end of Article 7.1.3:

Except as permitted in Article 7.3, a change in the Contract Sum or the Contract Time shall only be accomplished by written change order. Therefore, the Contractor acknowledges that it is not entitled to a change in the Contract Sum or the Contract Time in the absence of a written change order on the basis of the course of conduct or dealings between the parties and/or the Owner's express or implied acceptance of alterations or additions to the Work and/or the Owner has been unjustly enriched by the Contractor's Work or any other basis otherwise allowed by law or the facts and Contractor agrees that any such extra or changed work was performed by it as a volunteer.

## 7.2 CHANGE ORDERS

### 7.2.2 Add the following Article 7.2.2:

Contractor's execution of a change order constitutes a final settlement to the Contract Sum and construction schedule and the Contract Time for all matters relating to or arising out of the change in the Work that is the subject of the change order including, but not limited to, all direct and indirect costs associated with such change, all extended direct job site and home office overhead expenses and any and all delay and impact cost for the change, whether alone or in combination with other changes, including any impact, ripple or cumulative effect resulting therefrom, if any.

### 7.2.3 Add the following Article 7.2.3:

Adjustments to the Contract Sum by change order shall be based upon one of the methods set forth in Article 7.3.3.1, 7.3.3.2, 7.3.3.3 or 7.3.3.4, as appropriate. A reasonable allowance for the combined overhead and profit included in the change order shall be based upon the schedule set forth in Article 7.3.11, as supplemented.

### 7.2.4 Add the following Article 7.2.4:

In order to facilitate consideration of change order requests, all such requests, except those involving an amount less than \$500 must be accompanied by a complete itemization of costs, including labor, materials and subcontractor costs which shall likewise be itemized. Changes for more than \$500 will not be approved without such itemization.

## 7.3 CONSTRUCTION CHANGE DIRECTIVES

### 7.3.5 Add "Owner or" between "the" and "Contractor" in both places they appear in this Article.

### 7.3.8 Delete the first sentence and insert the following:

The amount of credit to be given by the Contractor to the Owner for a deletion or change which results in a net decrease in the Contract Sum shall be the actual net cost plus reasonable allowance for overhead on net cost and profit thereon as approved by the Architect and Owner.

### 7.3.11 Add the following Article 7.3.11:

The allowance for overhead and profit combined, including extended direct job and home office overhead and any and all delay, impact, inefficiency, disruption and ripple effect to be included in the total cost to the Owner, shall be based on the following



schedule:

- .1 For the Contractor, for work performed by the Contractor's own forces, 15 percent of the cost.
- .2 For the Contractor, for work performed by the Contractor's subcontractor, 10 percent of the amount due the subcontractor.
- .3 For each subcontractor or sub-subcontractor involved, for work performed by that subcontractor or sub-subcontractor's own forces, 15 percent of the cost.
- .4 For each subcontractor, for work performed by the subcontractor's sub-subcontractor's, 10 percent of the amount due the sub-subcontractor.
- .5 Costs to which overhead and profit is to be applied shall be determined in accordance with Article. 7.3.4.

## ARTICLE 8 - TIME

### 8.2 PROGRESS AND COMPLETION

#### 8.2.1 Add the following to the end of the second sentence:

and that the Contractor is fully capable of properly completing the Work within the Contract Time.

### 8.3 DELAYS AND EXTENSIONS OF TIME

#### 8.3.3 Add the following to the end of Article 8.3.3:

No delay, interference, hindrance or disruption, from whatever source or cause, in the progress of the Contractor's Work shall be a basis for an extension of time and/or additional compensation, unless the delay, interference, hindrance or disruption (1) is without the fault and not the responsibility of the Contractor, its subcontractors and/or suppliers and (2) directly affects the overall completion of the Work as reflected on the critical path of the Contractor's updated and accepted construction schedules. The Contractor expressly agrees that the Owner shall have the benefit of any float in the construction schedule and that delays to construction activities, which do not affect the overall completion of the Work, do not entitle the Contractor to any extension in the Contract Time and/or increase in Contract Sum.

#### 8.3.4 Add the following Article 8.3.4:

All claims by the Contractor for an increase in the Contract Time must follow the procedures set forth in Articles 15.1.2, 15.1.3, 15.1.5 and 15.1.6, including the requirement that the Contractor give written notice of any claim within twenty-one (21) days after occurrence of the event giving rise to such claim or within twenty-one (21) days after the Contractor first recognizes the condition giving rise to the claim, whichever is earlier.

#### 8.3.5 Add the following Article 8.3.5:

If the Contractor submits a schedule indicating or otherwise expressing an intent to complete the Work prior to the date of substantial completion, the Owner shall have no

liability to the Contractor for any failure by the Contractor to complete the Work prior to the expiration of the Contract Time.

## ARTICLE 9 - PAYMENTS AND COMPLETION

### 9.3 APPLICATION FOR PAYMENTS

#### 9.3.1 Add the following sentence to the end of Article 9.3.1:

The form of Application for Payment will be the current edition of the AIA Document G702, Application and Certification for Payment, supported with AIA Document G703, Continuation Sheet.

#### 9.3.1.3 Add the following Article 9.3.1.3:

In any contract awarded by the state of Mississippi or any agency, unit or department of the State of Mississippi, or by any political subdivision thereof, the amount of retainage that may be withheld is governed by Mississippi law.

#### 9.3.2.1 Add the following Article 9.3.2.1:

Payment for materials stored at some location other than the Project site, may be approved by the Architect and the Owner after the Contractor has submitted the following items:

- .1 An acceptable Lease Agreement between the Contractor or one of its subcontractors or suppliers and the owner of the land, or building, where the materials are stored covering the specific area where the materials are located.
- .2 Consent of Surety or other acceptable bond to cover the materials stored off-site.
- .3 All Perils Insurance coverage for the full value of the materials stored off-site.
- .4 A Bill of Sale from the Manufacturer to the Contractor for the stored materials.
- .5 A complete list and inventory of materials manufactured, stored and delivered to the storage site and of materials removed from the storage site and delivered to the Project.
- .6 A review by the Architect of the materials stored off-site prior to release of payment.
- .7 Proof of payment of stored materials verified by the supplier must be submitted to the Architect within thirty (30) days of the Application for Payment on which payment for said materials was made. If proof of payment is not submitted within thirty (30) days, then payment for said materials will be deducted from the next application for payment and withheld until proof of payment is received.

### 9.5 DECISIONS TO WITHHOLD CERTIFICATION

#### 9.5.1.7 Delete the word "repeated".

## 9.5.1.8 Add the following Article 9.5.1.8:

The letter from the Contractor which is required by Article 15.1.6.2 has not been received.

## 9.6 PROGRESS PAYMENTS

## 9.6.1 Delete Article 9.6.1 in its entirety and insert the following:

Subject to the conditions of the Contract, the Owner shall make payment to the Contractor in the amount certified within thirty (30) days after receipt of the Certificate for Payment from the Architect. Payment shall not be considered late until thirty (30) days after Owner's receipt of the approved Certificate for Payment from the Architect.

9.6.1.1 Contractor's Applications for Payment shall be submitted on or before the 25<sup>th</sup> day of each month. Any application not submitted on or before this date may not be processed or approved until the following month.

## 9.6.7 Delete the word "Unless" from the first sentence and insert the phrase "Whether or not."

Add the following to the end of Article 9.6.7:

The amount retained by the Contractor from each payment to each Subcontractor and material supplier shall not exceed the percentage retained by the Owner from the Contractor for the Subcontractor's Work.

## 9.7 FAILURE OF PAYMENT

## 9.7 In the first sentence, delete the words "or awarded by binding dispute resolution".

## 9.8 SUBSTANTIAL COMPLETION

## 9.8.1 Delete Article 9.8.1 in its entirety and insert the following:

Substantial completion for purposes of this Contract occurs only upon Contractor's compliance with the following conditions precedent: (a) the Contractor furnishes to the Architect all close-out documents required by the Contract Documents in a form satisfactory to the Architect and the Owner, (b) the Contractor furnishes the manufacturers' certifications and/or warranties required by the Contract Documents; (c) the Contractor furnishes the Guarantee of Work set forth hereinbelow; and (d) the Architect certifies that the Work is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended purpose.

The Guarantee of Work shall be submitted as a separate document signed by Contractor and Contractor's Surety and shall state the following:

Contractor and Contractor's Surety hereby guarantee that all Work performed on the Project is free from defective and/or nonconforming materials and workmanship and that for a period of one year from the date of substantial completion or such longer period of time as may be called for in the Contract

Documents for such portions of the Work, Contractor or its Surety will repair and/or replace any defective and/or nonconforming materials and workmanship in accordance with the requirements of the Contract Documents.

9.8.2.1 Add the following Article 9.8.2.1:

The Contractor shall be responsible for the costs of inspections made by the Architect including any and all other related expenses incurred by the Architect for providing services for the Project required by failure of the Contractor to achieve final acceptance / completion of the Project within 30 days after the first occurrence of the below described events:

1. Specified date of Substantial Completion; or
2. Actual date of Substantial Completion.
3. More than two (2) reviews of close out documents.

The costs of the Architect's additional services shall be deducted by the Owner from the Contractor's final application for payment to pay the Architect for additional services required by the Contractor's failure to achieve final completion of the project within the 30-day period described above. These additional services are above and beyond any liquidated damages that the Owner may be due per Contract Documents.

9.8.4 Delete the last sentence of Article 9.8.4 and insert the following:

Warranties required by the Contract Documents shall commence and continue for one (1) year from the date of Substantial Completion except that the roof system shall be warranted for a period of three (3) years from the date of Substantial Completion.

9.8.5 Add the following to the end of Article 9.8.5:

Contractor's execution of the Certificate of Substantial Completion constitutes Contractor's representation that the items on the list accompanying the Certificate can and will be completed by Contractor and his subcontractors within thirty (30) days of Contractor's execution of the Certificate. Based upon this representation by Contractor and upon the acknowledgment of the Architect that the listed items remaining can be completed within thirty (30) days, the Owner agrees to execute the Certificate of Substantial Completion. If Contractor fails to complete the items on the list within thirty (30) days of Contractor's execution of the Certificate, then the Owner, at its option and without prejudice to any other rights or remedies it may have under this Contract or otherwise and without notice to Contractor or Surety, may proceed to have same completed and to deduct the reasonable costs thereof from the amounts then due or thereafter to become due to Contractor.

9.8.6 Add the following Article 9.8.6:

The costs of inspections made by Architect which are not required by Articles 4, 9.8 or 9.10 of the General Conditions and any other inspection required by Article 12 other than the year-end inspection itself, will be the responsibility of the Contractor and will be deducted by the Owner from the Application for Payment submitted after the Owner's receipt of the Architect's statement for its costs of additional inspections. These costs are not the result of Contractor's failure to timely complete the Contract within the specified time and, therefore, such costs are in addition to and not a part of any liquidated damages calculation, if any.

9.8.7 Add the following Article 9.8.7:

Upon the Owner’s acceptance of the Work as substantially complete and upon Contractor’s compliance with all conditions precedent to substantial completion as stated in Section 002213, Article 9.8.1 and upon application by the Contractor, the Owner will pay to the Contractor all retainage held by the Owner less an amount equal to the greater of (a) two percent (2.0%) of the Contract Sum, or (b) two hundred percent (200%) of the estimated cost of the Work remaining to be performed by the Contractor in accordance with the Architect’s determination. Final payment, including all retainage, shall be made at the time and in the manner provided for final payment in accordance with the provisions of Article 9.10 and the additional conditions precedent to final acceptance / payment set forth in Section 002213, Article 9.8.5.

9.9 PARTIAL OCCUPANCY OR USE

9.9.1.2 Add the following Article 9.9.1.2:

The Owner’s occupancy or use of any completed or partially completed portions of the Work shall not affect Contractor’s obligation to complete incomplete items on the list attached to the Certificate of Substantial Completion within the time fixed in the Certificate and does not waive Owner’s right to obtain completion of incomplete items at Contractor’s expense upon Contractor’s failure to timely complete same.

9.11 LIQUIDATED DAMAGES

Liquidated Damages. Time being of the essence of this Contract and a matter of material consideration thereof, a reasonable estimate in advance is established to cover losses incurred by the Owner if the Project is not substantially complete on the date set forth in the Contract Documents. The Contractor and his Surety will be liable for and will pay the Owner the sums hereinafter stipulated as fixed and agreed as liquidated damages for each calendar day for delay until the Work is substantially complete. The Contractor and his Surety acknowledge that the Owner’s losses caused by the Contractor’s delay are not readily ascertainable and that the amount estimated per day for liquidated damages is reasonable and is not a penalty.

The amount established per day for liquidated damages is **\$1,000.00**.

ARTICLE 10 - PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS Add the following to the end of Article 10.1:

The Architect shall not administer the Contractor’s performance of its duties and responsibilities under Article 10 (including Articles 10.1 through 10.6) because the initiation, maintenance and supervision of safety precautions and programs is the sole responsibility of the Contractor as means, methods, techniques, sequences and procedures of construction and, therefore, is not part of the Contractor’s scope of Work which is to be administered by the Architect.

ARTICLE 11 - INSURANCE AND BONDS

SEE AIA DOCUMENTS A101 – 2017 EXHIBIT A & A201-2017 GENERAL CONDITIONS

11.4 LOSS OF USE, BUSINESS INTERRUPTION, AND DELAY IN COMPLETION ` INSURANCE

11.4 Delete Article 11.4 in its entirety.

ARTICLE 12 - UNCOVERING AND CORRECTION OF WORK

12.1 UNCOVERING OF WORK

12.1.2 Delete the second sentence of Article 12.1.2 entirely and replace with:

“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.”

12.2 CORRECTION OF WORK

12.2.2 AFTER SUBSTANTIAL COMPLETION

12.2.2.1 Add the following to the end of Article 12.2.2.1:

Prior to the end of the one-year period, (three years for roof systems), the Architect may schedule a warranty inspection which shall be attended by the Architect, the Owner, the Contractor and all major subcontractors. During this inspection, the parties shall identify all defective and/or nonconforming items and fix a time within which all defective and/or nonconforming items shall be repaired and/or replaced.

12.2.2.1.1 Add the following Article 12.2.2.1.1:

Within the one-year period (three years for roof systems) provided for in the Guarantee of Work required by Article 9.8.1, if repairs or replacement are requested by Owner in connection with the Work which, in the opinion of the Owner, are rendered necessary as a result of the use of materials, equipment or workmanship which are inferior, defective or not in accordance with the Contract Documents, the Contractor and/or its Surety shall promptly, upon receipt of notice from and without expense to the Owner, place in satisfactory condition in every particular, all such Work, correct all defects therein and make good all damages to the building, site, equipment or contents thereof; and make good any work or materials or the equipment and contents of said buildings or site disturbed in fulfilling any such guarantee. If, after notice or within the time agreed upon by the parties at the warranty inspection, the Contractor and/or its Surety fail to proceed promptly to comply with the terms of the guarantee, the Owner may have the defects corrected in accordance with Article 2.5 and the Contractor and his Surety shall be liable for all expenses incurred. All special guarantees applicable to definite parts of the Work stipulated in the Contract Documents shall be subject to the terms of this paragraph during the first year of the life of such special guarantee.

ARTICLE 13 - MISCELLANEOUS PROVISIONS

13.5 INTEREST

13.5 Delete Article 13.5 in its entirety and insert the following:

Payments due and unpaid under the Contract Documents shall bear interest as provided by applicable Mississippi law.

### 13.6 ATTORNEYS' FEES AND EXPENSES

Add the following Article 13.6 to private projects not funded in whole or in part by public monies.

The prevailing party in any dispute between the parties arising out of or related to this Agreement or the breach thereof, shall be entitled to reasonable attorneys' and expert witness(es) fees and expenses incurred in pursuing or defending any claim.

## ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT

### 14.1 TERMINATION BY THE CONTRACTOR

14.1.1.4 Delete Article 14.1.1.4 in its entirety.

14.1.3 Delete ", as well as reasonable overhead and profit on Work not executed," between "executed" and "and" in the third line.

### 14.2 TERMINATION BY THE OWNER FOR CAUSE

14.2.1.1 Delete the word "repeatedly" from Article 14.2.1.1.

14.2.1.3 Delete the word "repeatedly" from Article 14.2.1.3.

14.2.1.5 Add the following Articles 14.2.1.5 and 14.2.1.6:

.5 fails to achieve Substantial Completion of the Project as described in Section 002213, Article 9.8.5, within the time stated therein;

.6 fails to meet any deadline required by the Contract. Contractor acknowledges that time is of the essence of this Contract and that all deadlines required by the Contract are critical to timely completion of the Contract. Therefore, Contractor agrees that its failure to meet any deadline constitutes a substantial and material breach of this Contract, entitling the Owner to terminate the Contract.

14.2.2 Delete the word "certification" in the first sentence and insert the word "advice".

14.2.4 Delete the phrase "Initial Decision Maker" and insert the word "Architect".

14.2.5 Add the following Article 14.2.5:

If the Owner terminates the Contract for cause, and it is determined for any reason that the Contractor was not actually in default under the Contract at the time of termination, the Contractor shall be entitled to recover from the Owner the same amount as the Contractor would be entitled to receive under a termination for convenience as provided by Article 14.4. The foregoing shall constitute the Contractor's sole and exclusive remedy for termination of the Contract. In no event shall the Contractor be entitled to special, consequential, or exemplary damages, nor shall the Contractor be entitled to anticipated profits resulting from termination of this

Contract.

#### 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

- 14.4.3 Add after the end of that sentence: "The Contractor shall not be entitled to receive any payment for either overhead or profit on work not performed."

### ARTICLE 15 - CLAIMS AND DISPUTES

- 15.1.2 Delete the phrase "in accordance with the requirements of the final dispute resolution method selected within the Agreement".

#### 15.1.6 CLAIMS FOR ADDITIONAL TIME

- 15.1.6.2 Add the following to the end of Article 15.1.6.2:

The Contractor must submit each month with his Application for Payment a separate letter stating that he is requesting an extension of time for abnormal adverse weather or that he has no claim for an extension for that period of time. Payment is not due on the Application for Payment until the letter is received. Complete justification, including weather reports, daily reports, correspondence and any other supporting data must be provided for each day for which a request for time extension is made. A letter or statement that the Contractor was delayed is not as adequate justification. The receipt of this request and data by the Architect will not be considered as Owner or Architect approval of a time extension in any way.

- 15.1.6.3 Add the following Article 15.1.6.3:

Time Extension for Weather Not Allowed: Add the following in lieu of Article 15.1.6.3:

The Contractor assumes the risk of both normal and abnormally adverse weather and will not be entitled to any time extension or Contract price adjustment for either normal or abnormally adverse weather encountered during construction, notwithstanding any other provision of the Contract to the contrary.

- 15.1.6.4 Add the following Article 15.1.6.4:

Claims for increase in the Contract Time shall set forth in detail the facts and circumstances which support such Claim, including but not limited to, the cause of such delay, the date such delay began to affect the critical path, the date such delay ceased to affect the critical path and the number of days of additional time requested. The Contractor shall not be entitled to an increase in the Contract Time for delays which did not affect the critical path or to the extent there were concurrent non-excusable delays. The Contractor may be requested to provide additional documentation to substantiate its Claim, including but not limited to, schedules that indicate all activities affected by such delay.

- 15.1.8 Add the following Article 15.1.8:

The Contractor expressly agrees that the Article 15 Claims and Disputes process is the only dispute resolution mechanism that will be recognized by the parties for any claims put forward by the Contractor, notwithstanding any other claimed theory of entitlement on the part of the Contractor or its subcontractors or suppliers against



the Owner and/or the Architect or any of their design consultants, including, but not limited to, all claims of breach of contract, breach of warranty, misrepresentation, negligence, professional negligence, and/or any other tort.

## 15.2 INITIAL DECISION

15.2.4 Add "within thirty (30) days" to the end of Article 15.2.4.

## 15.3 MEDIATION

15.3.1 Delete the phrase "shall be subject to mediation as a condition precedent to binding dispute resolution" and insert the phrase "may be subject to mediation upon mutual agreement of the Owner and Contractor".

15.3.2 Delete the word "shall: in the first sentence wherever it appears and insert the word "may".

15.3.3 Delete Article 15.3.3 in its entirety.

## 15.4 ARBITRATION

15.4.1 Delete the words "parties have" in the first sentence and insert the words "Owner has" and delete the phrase "unless the parties mutually agree" in the first sentence and insert the phrase "unless the Owner chooses".

## 15.4.4 CONSOLIDATION OR JOINDER

15.4.4 Delete Article 15.4.4, including subparts .1 - .3, in its entirety and insert the following:

15.4.4.1 The Owner, at its sole discretion, may consolidate any arbitration, if any, conducted under this Agreement with any other arbitration to which it is a party where the Owner determines that the arbitrations to be consolidated substantially involve common questions of law or fact and the Owner, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration.

**END OF SECTION 002213**



**SECTION 004200 - PROPOSAL FORM**

(Submit in Duplicate)

BIDDER: \_\_\_\_\_

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

ADDRESS: \_\_\_\_\_

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

DATE: \_\_\_\_\_

**Pascagoula-Gautier School District  
1006 Communy Avenue  
Pascagoula, MS 39568**

**RE: Gautier Elementary School Kitchen Renovation (RE-BID)**

Having carefully examined the Contract Documents and all addenda for the referenced Project, as well as the premises and conditions affecting the work, I, the undersigned, propose to furnish all labor, materials, and services required by the Contract Documents in accordance with the conditions of said Contract Documents for the sums set forth below:

TOTAL BID:

\_\_\_\_\_  
\_\_\_\_\_ (\$\_\_\_\_\_).

**PROPOSED PERSONNEL AND RELEVANT EXPERIENCE:**

Prime Bidder shall include the following information, with his bid, such that the lowest and best bidder may be evaluated:

Attach a list of projects completed within the last five (5) years that are similar to this project in size, complexity, cost, and schedule constraints. Include no less than the following information:

- a. Name of the Project
- b. Owner's name and contact information
- c. Contract's original sum and final contract amount
- d. Contract's original Substantial Completion date and actual Substantial Completion date
- e. Indicate if there were any claims, Liquidated Damages imposed, etc.

Attach a resume of the Proposed Project Manager.

Attach a resume of the Proposed Project Superintendent.

I (We) agree to hold our bid open for acceptance for sixty (60) calendar days from the date of bid opening.

If awarded this Contract, I, (We), agree to execute a Contract and start work on September 25, 2023 (the anticipated effective date of the Notice to Proceed) and to complete the entire work in two hundred and eighty (280) consecutive calendar days. Therefore, the specified date of substantial completion shall be July 1, 2024.

By signing this proposal form, \_\_\_\_\_ (insert company name) is certifying that neither \_\_\_\_\_ (insert company name) nor any potential subcontractors are debarred or suspended or are otherwise excluded or ineligible for participation in Federal Assistance Programs.

The attached Non-Collusive Form must also be completed, notarized, and included when submitting this Proposal. Any requested information not submitted may cause Proposal to be rejected.

**LIQUIDATED DAMAGES:** For each calendar day thereafter that substantial completion of the contract is delayed, liquidated damages will be assessed as follows: \$1,000.00 per calendar day. NO TIME EXTENSIONS WILL BE ALLOWED.

As required by Section 002113-1.06, "Bid Security", Bid Security in the form of a bid bond or cashier/certified check is attached hereto in the amount of 5% of the base bid amount and shall become the property of the Owner in the event the Agreement and required Bonds are not executed within the time set forth hereinbefore as liquidated damages for the delay and additional expense to the Owner caused thereby.

ADDENDUM RECEIPT: The receipt of the following Addenda to the Bidding Documents is hereby acknowledged:

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

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

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

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

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

**SUBCONTRACTOR AND SUPPLIER LISTING:**

So that the Owner may be assured that only qualified and competent subcontractors and suppliers will be utilized on the project and to prevent "bid-shopping" and/or "bid- chopping", the low Bidder shall identify on the attached form within seven (7) days after bid receipt the names of the subcontractors and suppliers used by the Bidder in his bid for each subcontractor and supplier whose bid exceeds \$50,000.00.

Bidder acknowledges that his failure to indicate the name(s) of the subcontractors and suppliers included in his lump sum price within seven (7) days after bid receipt may result in the rejection of the Bidder's bid as nonresponsive and that Bidder's listing of itself as a subcontractor or supplier for any of the classifications or categories listed below means that Bidder will furnish the product from its manufacturing inventory or perform such work with its own regularly employed personnel and that Bidder has satisfactory qualifications and prior experience performing such work with its regularly employed personnel or manufacturing and furnishing such product from its manufacturing inventory. Bidder further acknowledges that he assumes the risk of removing and replacing work performed and/or products furnished by unauthorized substitutions of listed subcontractors and suppliers who will be rejected in accordance with Section 002213, Paragraph 5.2.5:

**[TO BE COMPLETED IF A CORPORATION]**

Our Corporation is chartered under the laws of the State of \_\_\_\_\_, and the names, titles and business addresses of the principal officers are as follows (non-resident Bidders see Section 002113, Paragraph 1.05):

Name	Address (City, State Zip)	Title

**[TO BE FILLED IN IF A PARTNERSHIP]**

Our Partnership is composed of the following individuals:

Name	Address (City, State Zip)	Title

Notice of acceptance of our bid may be mailed, telegraphed, faxed or delivered to:

[INSERT COMPANY NAME AND ADDRESS]

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SIGNED: \_\_\_\_\_

TITLE: \_\_\_\_\_

CERTIFICATE OF RESPONSIBILITY NO.: \_\_\_\_\_

**DIRECTIONS FOR MAILING:**

Submit bid papers in sealed envelope marked as indicated in the Instructions to Bidders, inserted in opaque sealed envelope marked as follows:

**Address To:**

Pascagoula-Gautier School District  
1006 Communny Avenue  
Pascagoula, MS 39568

OR

DIRECTIONS FOR ELECTRONIC BIDS: [www.pgsgbids.com](http://www.pgsgbids.com)

Bid for Gautier Elementary School Kitchen Renovation (RE-BID)

to be opened at 2:00 PM on Friday, September 8, 2023.

**FORM OF NON-COLLUSIVE AFFIDAVIT**

**AFFIDAVIT**

**(Prime Bidder shall include this form, completed, with his bid)**

State of \_\_\_\_\_

County of \_\_\_\_\_

\_\_\_\_\_, being first duly sworn, deposes and says:

That he is \_\_\_\_\_ the party making the (a partner or officer of the firm of, etc.) foregoing proposal or bid, that such proposal or bid is genuine and not collusive or sham; that said bidder has not colluded, conspired, connived or agreed, directly or indirectly, with any bidder or person, to put in a sham bid or to refrain from bidding, and has not in any manner, directly or indirectly, sought by agreement or collusion, communication or conference, with any person, to fix the bid price of affiant or of any other bidder, or to fix any overhead, profit or cost element of said bid price, or of that of any other bidder, or to secure any advantage against \_\_\_\_\_ (Insert Owner Name) or any person interested in the proposed contract; and that all statements in said proposal or bid are true.

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

Bidder, if the bidder is an individual:

\_\_\_\_\_  
Partner, if the bidder is partnership

\_\_\_\_\_  
Officer, if the bidder is a corporation:

Subscribed and sworn to before me the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

My commission expires \_\_\_\_\_





**SECTION 005200 - AGREEMENT FORM**

1.01 DESCRIPTION

- A. The Owner will use AIA Document A101, 2017 Edition, Standard Form of Agreement Between Owner and Contractor, where basis for Payment is a Stipulated Sum as a part of the Contract Documents.
- B. A copy of this document is on file at the Architect's office. All Bidders shall read and understand the referenced document.

END OF SECTION **005200**



**SECTION 005200.01 - INSURANCE AND BONDS EXHIBIT**

1.01 DESCRIPTION

- A. The Owner will use AIA Document A101, 2017 Edition, Exhibit A Insurance and Bonds. This insurance and bonds exhibit is a critical part of the A101-2017, Standard Form of Agreement Between Owner and Contractor and should be discussed with legal and insurance counsel.
  
- B. A sample of AIA Document A101-2017, Exhibit A Insurance and Bonds dated 08/07/2023 is attached to this section. Upon project award, this document will be finalized and will become an exhibit to the A101-2017 Owner-Contractor Agreement.

END OF SECTION **005200.01**



# DRAFT AIA® Document A101™ – 2017 Exhibit A

## Insurance and Bonds

This Insurance and Bonds Exhibit is part of the Agreement, between the Owner and the Contractor, dated the « » day of « » in the year « »  
(In words, indicate day, month and year.)

for the following **PROJECT:**  
(Name and location or address)

«Pascagoula-Gautier School District  
Gautier Elementary School Kitchen Renovation (RE-BID)  
«P.N. 22050.01 »

**THE OWNER:**  
(Name, legal status and address)

«Pascagoula-Gautier School District  
1006 Communy Avenue  
Pascagoula, MS 39568 »« »  
«Telephone Number: 228.938.6491»  
«Fax Number: 228.938.6528 »« »

**THE CONTRACTOR:**  
(Name, legal status and address)

« »« »  
« »

### TABLE OF ARTICLES

- A.1 GENERAL
- A.2 OWNER’S INSURANCE
- A.3 CONTRACTOR’S INSURANCE AND BONDS
- A.4 SPECIAL TERMS AND CONDITIONS

#### ARTICLE A.1 GENERAL

The Owner and Contractor shall purchase and maintain insurance, and provide bonds, as set forth in this Exhibit. As used in this Exhibit, the term General Conditions refers to AIA Document A201™–2017, General Conditions of the Contract for Construction.

#### ARTICLE A.2 OWNER’S INSURANCE

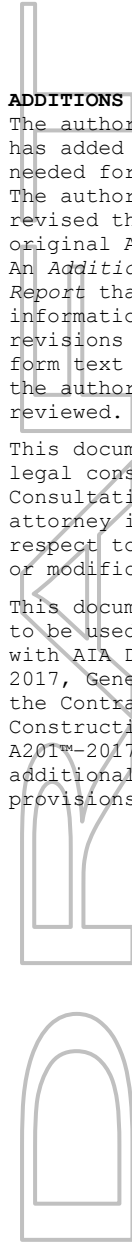
##### § A.2.1 General

Prior to commencement of the Work, the Owner shall secure the insurance, and provide evidence of the coverage, required under this Article A.2 and, upon the Contractor’s request, provide a copy of the property insurance policy or policies required by Section A.2.3. The copy of the policy or policies provided shall contain all applicable conditions, definitions, exclusions, and endorsements.

**ADDITIONS AND DELETIONS:**  
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed.

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

This document is intended to be used in conjunction with AIA Document A201™–2017, General Conditions of the Contract for Construction. Article 11 of A201™–2017 contains additional insurance provisions.



**ELECTRONIC COPYING** of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

**§ A.2.2 Liability Insurance**

The Contractor will pay for and maintain such insurance as will protect the Owner and Architect from their contingent liability to others for damages because of bodily injury, including death, which may arise from operations under this Contract and other liability for damages which the Contractor is required to insure under any provision of this Contract. Certificate of this insurance shall be filed with the Owner and Architect and will be the same limits set forth in this Exhibit A, Article A.3.2.2.

**§ A.2.3 Required Property Insurance**

**§ A.2.3.1** The Contractor shall purchase and maintain, from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located, property insurance written on a builder's risk "all-risks" completed value or equivalent policy form and sufficient to cover the total value of the entire Project on a replacement cost basis. The Contractor's property insurance coverage shall be no less than the amount of the initial Contract Sum, plus the value of subsequent Modifications and labor performed and materials or equipment supplied by others. The property insurance shall be maintained until final payment has been made as provided in Article 9.10 of the AIA A201-2017 or until no person or entity other than the Owner has an insurable interest in the property required by this Section A.2.3 to be covered, whichever is later. This insurance shall include the interests of the Owner, Contractor, Subcontractors, and Sub-subcontractors in the Project as insureds. This insurance shall include the interests of mortgagees as loss payees.

**§ A.2.3.1.1 Causes of Loss.** The insurance required by this Section A.2.3.1 shall provide coverage for direct physical loss or damage, and shall not exclude the risks of fire, explosion, theft, vandalism, malicious mischief, collapse, earthquake, flood, or windstorm. The insurance shall also provide coverage for ensuing loss or resulting damage from error, omission, or deficiency in construction methods, design, specifications, workmanship, or materials. Sub-limits, if any, are as follows:

*(Indicate below the cause of loss and any applicable sub-limit.)*

Causes of Loss	Sub-Limit

**§ A.2.3.1.2 Specific Required Coverages.** The insurance required by this Section A.2.3.1 shall provide coverage for loss or damage to falsework and other temporary structures, and to building systems from testing and startup. The insurance shall also cover debris removal, including demolition occasioned by enforcement of any applicable legal requirements, and reasonable compensation for the Architect's and Contractor's services and expenses required as a result of such insured loss, including claim preparation expenses. Sub-limits, if any, are as follows:

*(Indicate below type of coverage and any applicable sub-limit for specific required coverages.)*

Coverage	Sub-Limit

**§ A.2.3.1.3** The Contractor shall continue the insurance required by Section A.2.3.1 or, if necessary, replace the insurance policy required under Section A.2.3.1 with property insurance written for the total value of the Project that shall remain in effect until expiration of the period for correction of the Work set forth in Section 12.2.2 of the General Conditions.

**§ A.2.3.1.4 Deductibles and Self-Insured Retentions.** If the property insurance requires minimum deductibles, the Contractor shall pay the deductible and all other costs not covered because of such deductibles. If the Contractor or insurer increases the required minimum deductibles above the amounts so identified or if the Contractor elects to purchase this insurance with voluntary deductible amounts, the Contractor shall be responsible for payment of the additional costs not covered because of such increased or voluntary deductibles.

**§ A.2.3.1.5** The insurance required by this Section A.2.3.1 shall provide coverage for physical damage to property while it is in storage and in transit to the construction site on an 'all-risks' completed value form.

**§ A.2.3.1.6** The insurance required by this Section A.2.3.1 shall provide coverage for property owned by the Contractor and used on the Project, including scaffolding and other equipment.

**§ A.2.3.2 Occupancy or Use Prior to Substantial Completion.** The Owner’s occupancy or use of any completed or partially completed portion of the Work prior to Substantial Completion shall not commence until the insurance company or companies providing the insurance under Section A.2.3.1 have consented in writing to the continuance of coverage. The Owner and the Contractor shall take no action with respect to partial occupancy or use that would cause cancellation, lapse, or reduction of insurance, unless they agree otherwise in writing.

**§ A.2.3.3 Insurance for Existing Structures**

If the Work involves remodeling an existing structure or constructing an addition to an existing structure, the Contractor shall purchase and maintain, until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, “all-risks” property insurance, on a replacement cost basis, protecting the existing structure against direct physical loss or damage from the causes of loss identified in Section A.2.3.1, notwithstanding the undertaking of the Work. The Contractor shall be responsible for all co-insurance penalties.

**§ A.2.4 Optional Extended Property Insurance.**

The Owner shall purchase and maintain the insurance selected and described below.

*(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. For each type of insurance selected, indicate applicable limits of coverage or other conditions in the fill point below the selected item.)*

**§ A.2.4.1 Loss of Use, Business Interruption, and Delay in Completion Insurance,** to reimburse the Owner for loss of use of the Owner’s property, or the inability to conduct normal operations due to a covered cause of loss.

**§ A.2.4.2 Ordinance or Law Insurance,** for the reasonable and necessary costs to satisfy the minimum requirements of the enforcement of any law or ordinance regulating the demolition, construction, repair, replacement or use of the Project.

**§ A.2.4.3 Expediting Cost Insurance,** for the reasonable and necessary costs for the temporary repair of damage to insured property, and to expedite the permanent repair or replacement of the damaged property.

**§ A.2.4.4 Extra Expense Insurance,** to provide reimbursement of the reasonable and necessary excess costs incurred during the period of restoration or repair of the damaged property that are over and above the total costs that would normally have been incurred during the same period of time had no loss or damage occurred.

**§ A.2.4.5 Civil Authority Insurance,** for losses or costs arising from an order of a civil authority prohibiting access to the Project, provided such order is the direct result of physical damage covered under the required property insurance.

**§ A.2.4.6 Ingress/Egress Insurance,** for loss due to the necessary interruption of the insured’s business due to physical prevention of ingress to, or egress from, the Project as a direct result of physical damage.

§ **A.2.4.7 Soft Costs Insurance**, to reimburse the Owner for costs due to the delay of completion of the Work, arising out of physical loss or damage covered by the required property insurance: including construction loan fees; leasing and marketing expenses; additional fees, including those of architects, engineers, consultants, attorneys and accountants, needed for the completion of the construction, repairs, or reconstruction; and carrying costs such as property taxes, building permits, additional interest on loans, realty taxes, and insurance premiums over and above normal expenses.

**§ A.2.5 Other Optional Insurance.**

The Owner shall purchase and maintain the insurance selected below.

*(Select the types of insurance the Owner is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance.)*

§ **A.2.5.1 Cyber Security Insurance** for loss to the Owner due to data security and privacy breach, including costs of investigating a potential or actual breach of confidential or private information. *(Indicate applicable limits of coverage or other conditions in the fill point below.)*

§ **A.2.5.2 Other Insurance**  
*(List below any other insurance coverage to be provided by the Owner and any applicable limits.)*

Coverage	Limits

**ARTICLE A.3 CONTRACTOR'S INSURANCE AND BONDS**

**§ A.3.1 General**

**§ A.3.1.1 Certificates of Insurance.** The Contractor shall provide certificates of insurance acceptable to the Owner evidencing compliance with the requirements in this Article A.3 at the following times: (1) prior to commencement of the Work; (2) upon renewal or replacement of each required policy of insurance; and (3) upon the Owner's written request. An additional certificate evidencing continuation of commercial liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment and thereafter upon renewal or replacement of such coverage until the expiration of the periods required by Section A.3.2.1 and Section A.3.3.1. The certificates will show the Owner and Architect as an additional insured on the Contractor's Commercial General Liability and excess or umbrella liability policy or policies and the Contractor's certificate of insurance must state that the Owner and Architect are additional insureds under the referenced CGL policy and that all of Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered by such CGL policy.

Any language contained on the certificate of insurance form or elsewhere to the contrary is deemed stricken.

The certificate of insurance must also state that all of Contractor's contractual liabilities, including but not limited to its indemnity obligations, are covered. Any terms and conditions contained in the certificate of insurance which are contrary to the Contractor's contractual obligations are hereby stricken from the certificate.

**§ A.3.1.2 Deductibles and Self-Insured Retentions.** The Contractor shall disclose to the Owner any deductible or self-insured retentions applicable to any insurance required to be provided by the Contractor.

**§ A.3.1.3 Additional Insured Obligations.** To the fullest extent permitted by law, the Contractor shall cause the commercial general liability coverage to include (1) the Owner, the Architect, and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions for which loss occurs during completed operations. The additional insured coverage shall be primary and non-contributory to any of the Owner's general liability insurance policies and shall



apply to both ongoing and completed operations. To the extent commercially available, the additional insured coverage shall be no less than that provided by Insurance Services Office, Inc. (ISO) forms CG 20 10 07 04, CG 20 37 07 04, and, with respect to the Architect and the Architect's consultants, CG 20 32 07 04.

**§ A.3.1.4** Furnish one copy of the certificate herein required for each copy of the Agreement, specifically setting forth evidence of all coverage required. Furnish to the Owner and Architect, copies of any endorsements that are subsequently issued amending coverage or limits. If the coverages are provided on a claims-made basis, the policy date or retroactive date shall predate the Contract and the termination date of the policy, or the applicable extended reporting period shall be no earlier than the termination date of coverages required to be maintained after final payment.

**§ A.3.2 Contractor's Required Insurance Coverage**

**§ A.3.2.1** The Contractor shall purchase and maintain the following types and limits of insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:  
(If the Contractor is required to maintain insurance for a duration other than the expiration of the period for correction of Work, state the duration.)

**§ A.3.2.2 Commercial General Liability**

**§ A.3.2.2.1** Commercial General Liability insurance for the Project written on an occurrence form with policy limits of not less than «One Million Dollars» (\$ «1,000,000») each occurrence, «Two Million Dollars» (\$ «2,000,000») general aggregate, and «Two Million Dollars» (\$ «2,000,000») aggregate for products-completed operations hazard, providing coverage for claims including

- .1 damages because of bodily injury, sickness or disease, including occupational sickness or disease, and death of any person;
- .2 personal injury and advertising injury;
- .3 damages because of physical damage to or destruction of tangible property, including the loss of use of such property;
- .4 bodily injury or property damage arising out of completed operations; and
- .5 the Contractor's indemnity obligations under Section 3.18 of the General Conditions.

**§ A.3.2.2.2** The Contractor's Commercial General Liability policy under this Section A.3.2.2 shall not contain an exclusion or restriction of coverage for the following:

- .1 Claims by one insured against another insured, if the exclusion or restriction is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim.
- .2 Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor.
- .3 Claims for bodily injury other than to employees of the insured.
- .4 Claims for indemnity under Section 3.18 of the General Conditions arising out of injury to employees of the insured.
- .5 Claims or loss excluded under a prior work endorsement or other similar exclusionary language.
- .6 Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language.
- .7 Claims related to residential, multi-family, or other habitational projects, if the Work is to be performed on such a project.
- .8 Claims related to roofing, if the Work involves roofing.
- .9 Claims related to exterior insulation finish systems (EIFS), synthetic stucco or similar exterior coatings or surfaces, if the Work involves such coatings or surfaces.
- .10 Claims related to earth subsidence or movement, where the Work involves such hazards.
- .11 Claims related to explosion, collapse and underground hazards, where the Work involves such hazards.

§ A.3.2.3 Automobile Liability covering vehicles owned, and non-owned vehicles used, by the Contractor, with policy limits of not less than «One Million Dollars» (\$ «1,000,000» ) per accident, for bodily injury, death of any person, and property damage arising out of the ownership, maintenance and use of those motor vehicles along with any other statutorily required automobile coverage.

§ A.3.2.4 The Contractor may achieve the required limits and coverage for Commercial General Liability and Automobile Liability through a combination of primary and excess or umbrella liability insurance, provided such primary and excess or umbrella insurance policies result in the same or greater coverage as the coverages required under Section A.3.2.2 and A.3.2.3, and in no event shall any excess or umbrella liability insurance provide narrower coverage than the primary policy. The excess policy shall not require the exhaustion of the underlying limits only through the actual payment by the underlying insurers.

§ A.3.2.5 Workers' Compensation at statutory limits.

§ A.3.2.6 Employers' Liability with policy limits not less than «One Million Dollars» (\$ «1,000,000» ) each accident, «One Million Dollars» (\$ «1,000,000» ) each employee, and «One Million Dollars» (\$ «1,000,000» ) policy limit.

§ A.3.2.7 Jones Act, and the Longshore & Harbor Workers' Compensation Act, as required, if the Work involves hazards arising from work on or near navigable waterways, including vessels and docks

§ A.3.2.8 If the Contractor is required to furnish professional services as part of the Work, the Contractor shall procure Professional Liability insurance covering performance of the professional services, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate.

§ A.3.2.9 If the Work involves the transport, dissemination, use, or release of pollutants, the Contractor shall procure Pollution Liability insurance, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate.

§ A.3.2.10 Coverage under Sections A.3.2.8 and A.3.2.9 may be procured through a Combined Professional Liability and Pollution Liability insurance policy, with combined policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate.

§ A.3.2.11 Insurance for maritime liability risks associated with the operation of a vessel, if the Work requires such activities, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate.

§ A.3.2.12 Insurance for the use or operation of manned or unmanned aircraft, if the Work requires such activities, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate.

§ A.3.3 Contractor's Other Insurance Coverage

§ A.3.3.1 Insurance selected and described in this Section A.3.3 shall be purchased from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Contractor shall maintain the required insurance until the expiration of the period for correction of Work as set forth in Section 12.2.2 of the General Conditions, unless a different duration is stated below:

*(If the Contractor is required to maintain any of the types of insurance selected below for a duration other than the expiration of the period for correction of Work, state the duration.)*

« »

§ A.3.3.2 The Contractor shall purchase and maintain the following types and limits of insurance in accordance with Section A.3.3.1.

*(Select the types of insurance the Contractor is required to purchase and maintain by placing an X in the box(es) next to the description(s) of selected insurance. Where policy limits are provided, include the policy limit in the appropriate fill point.)*

§ A.3.3.2.1 Property insurance of the same type and scope satisfying the requirements identified in

Section A.2.3, which, if selected in this section A.3.3.2.1, relieves the Owner of the responsibility to purchase and maintain such insurance except insurance required by Section A.2.3.1.3 and Section A.2.3.3. The Contractor shall comply with all obligations of the Owner under Section A.2.3 except to the extent provided below. The Contractor shall disclose to the Owner the amount of any deductible, and the Owner shall be responsible for losses within the deductible. Upon request, the Contractor shall provide the Owner with a copy of the property insurance policy or policies required. The Owner shall adjust and settle the loss with the insurer and be the trustee of the proceeds of the property insurance in accordance with Article 11 of the General Conditions unless otherwise set forth below: *(Where the Contractor’s obligation to provide property insurance differs from the Owner’s obligations as described under Section A.2.3, indicate such differences in the space below. Additionally, if a party other than the Owner will be responsible for adjusting and settling a loss with the insurer and acting as the trustee of the proceeds of property insurance in accordance with Article 11 of the General Conditions, indicate the responsible party below.)*

«Builder’s Risk \$Complete Contract Cost  
Or Installation Floater \$Cost of Material to be covered »

« » § A.3.3.2.2 Railroad Protective Liability Insurance, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate, for Work within fifty (50) feet of railroad property.

« » § A.3.3.2.3 Asbestos Abatement Liability Insurance, with policy limits of not less than « » (\$ « » ) per claim and « » (\$ « » ) in the aggregate, for liability arising from the encapsulation, removal, handling, storage, transportation, and disposal of asbestos-containing materials.

« » § A.3.3.2.4 Insurance for physical damage to property while it is in storage and in transit to the construction site on an “all-risks” completed value form.

« » § A.3.3.2.5 Property insurance on an “all-risks” completed value form, covering property owned by the Contractor and used on the Project, including scaffolding and other equipment.

«X » § A.3.3.2.6 Other Insurance  
*(List below any other insurance coverage to be provided by the Contractor and any applicable limits.)*

Coverage	Limits
OWNERS & CONTRACTORS PROTECTIVE LIABILITY: Bodily Injury & Property Damage Bodily Injury & Property Damage	\$1,000,000 Aggregate \$1,000,000 Per Occurrence
EXCESS LIABILITY: (Umbrella on projects over \$500,000) Bodily Injury & Property Damage (Combined Single Limit)	\$2,000,000 Aggregate \$2,000,000 Per Occurrence

**§ A.3.4 Performance Bond and Payment Bond**

The Contractor shall provide surety bonds, from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located, as follows:  
*(Specify type and penal sum of bonds.)*

Type	Penal Sum (\$0.00)
Payment Bond	\$Complete Contract Cost
Performance Bond	\$Complete Contract Cost

Payment and Performance Bonds shall be AIA Document A312™, Payment Bond and Performance Bond, or contain provisions identical to AIA Document A312™, current as of the date of this Agreement.

**ARTICLE A.4 SPECIAL TERMS AND CONDITIONS**

Special terms and conditions that modify this Insurance and Bonds Exhibit, if any, are as follows:

<< >>



**SECTION 007200 - GENERAL CONDITIONS NOTICE**

## 1.01 DESCRIPTION

- A. The General Conditions of the Contract for Construction, AIA Document A201 - 2017 of the American Institute of Architects, as revised at Section 002213, if not bound in this volume are incorporated by reference as though fully written herein.
- B. Contractors are presumed to be familiar with this document. A copy may be obtained from the Architect or examined in his office.
- C. All persons intending to provide goods or services in connection with this work are required to read and understand the referenced document prior to proceeding.
- D. See Section 002213 - Supplementary Conditions. In the event of a conflict between the General Conditions of the Contract for Construction, AIA Document A201 - 2017 and Section 002213, Section 002213 shall control even if the conflicting provision in the General Conditions of the Contract for Construction, AIA Document A201 - 2017 is not expressly deleted or revised by reference in Section 002213.

**END OF SECTION 007200**



**SECTION 008100 - FEDERAL REQUIREMENTS****PART 1 - GENERAL****1.1 EXECUTION**

- A. By executing this bid, I certify that this bid is submitted competitively and without collusion (GS. 143-54), that none of our officers, directors, or owners of an unincorporated business entity has been convicted of any violations of Chapter 78A of the General Statutes, the Securities Act of 1933, or the Securities Exchange Act of 1934 (G.S. 143-59.2), and that we are not an ineligible vendor as set forth in G.S. 143-59.1. False certification is a Class I felony.

**1.2 FEDERAL CONTRACTING REQUIREMENTS / UNIFORM GUIDANCE ATTACHMENT**

- A. This Uniform Guidance Attachment heretofore referenced as "UG Attachment" is incorporated into the Contract between Pascagoula-Gautier School District and the Contractor. Capitalized terms not defined in this Attachment shall have the meanings assigned to such terms in the Contract. All references to the "Contractor" or "Company" or "Vendor" or "Provider" shall be deemed to mean the Contractor.
- B. This Contract will be funded in whole or in part with federal funding. As such, federal laws, regulations, policies and related administrative practices apply to this Contract. The most recent of such federal requirements, including any amendments made after the execution of this Contract shall govern the Contract, unless the federal government determines otherwise. This UG Attachment identifies the federal requirements that may be applicable to this Contract. The Contractor is responsible for complying with all applicable provisions.
- C. To the extent possible, the federal requirements contained in the most recent version of the Uniform Administrative Requirements for federal awards (Uniform Rules) codified at 2.C.F.R., Part 200, including any certifications and contractual provisions required by any federal statutes or regulations referenced therein to be included in this contract are deemed incorporated into this Contract by reference and shall be incorporated into any sub-agreement or subcontract executed by the Contractor pursuant to its obligations under this Contract. The Contractor and its subcontractors, if any, hereby represent and covenant that they have complied and shall comply in the future with the applicable provisions of the original contract then in effect and with all applicable federal, state, and local laws, regulations, and rules and local policies and procedures, as amended from time to time, relating to Work to be performed under the Contract.
- D. Contracts for more than the simplified acquisition threshold currently set at \$150,000:  
When federal funds are expended by P-GSD, P-GSD reserves all rights and privileges

under the applicable laws and regulations with respect to this procurement in the event of breach of contract by either party.

- E. Termination for cause and for convenience by P-GSD: When federal funds are expended by P-GSD, P-GSD reserves the right to immediately terminate any agreement in excess of \$10,000 resulting from this procurement process in the event of a breach or default of the agreement by Contractor, in the event Contractor fails to: (1) meet schedules, deadlines, and/or delivery dates within the time specified in the procurement solicitation, contract, and/or a purchase order; (2) make any payments owed; or (3) otherwise perform in accordance with the contract and/or the procurement solicitation. P-GSD also reserves the right to terminate the contract immediately, with written notice to Contractor, for convenience, if P-GSD believes, in its sole discretion that it is in the best interest of P-GSD to do so. The Contractor will be compensated for work performed and accepted and goods accepted by P-GSD as of the termination date if the contract is terminated for convenience of P-GSD. Any award under this procurement process is not exclusive and P-GSD reserves the right to purchase goods and services from other vendors when it is in the best interest of P-GSD.
- F. Equal Employment Opportunity: Except as otherwise provided under 41 CFR Part 60, when funds will be expended by P-GSD on a contract that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3, Contractor certifies it will comply with the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964- 1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
- G. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148): During the term of an award for all contracts and subgrants for construction or repair, the Contractor certifies it will be in compliance with all applicable Davis-Bacon Act provisions. In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. P-GSD will report all suspected or reported violations to the Federal awarding agency.
- 1) The wage determination (including any additional classifications and wage rates conformed) and a [Davis-Bacon poster \(WH-1321\)](#) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen. The WH-1321 poster may be obtained at no charge from offices of the [Wage and Hour Division](#). In the absence of such posted information, any person who wants to determine if the project is covered should contact the federal agency funding or assisting the project or the Wage and Hour Division. Multi-year construction contracts that contain option provisions by which a contracting agency may unilaterally extend the term of the contract require inclusion of a current wage determination at the time the option is exercised. (In contrast, in situations where a contractor is given additional time to



complete original contract commitments, the wage determination in that contract applies).

- H. Copeland "Anti-Kickback" Act: Contractor certifies it will comply with the Copeland "Anti-Kickback" Act (40 U.S.C. 3145), as supplemented by Department of Labor regulations (29 CFR Part 3, "Contractors and Subcontractors on Public Building or Public Work Financed in Whole or in Part by Loans or Grants from the United States"). The Act provides that each contractor or subrecipient must be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he or she is otherwise entitled. P-GSD will report all suspected or reported violations to the Federal awarding agency.
- I. Contract Work Hours and Safety Standards Act (40 U.S.C. 3701-3708): The Contractor certifies that during the term of an award for all contracts in excess of \$100,000.00 that involve the employment of mechanics or laborers, the Contractor will be in compliance with all applicable provisions of the Contract Work Hours and Safety Standards Act. Under 40 U.S.C. 3702 of the Act, each contractor must be required to compute the wages of every mechanic and laborer on the basis of a standard work week of 40 hours. Work in excess of the standard work week is permissible provided that the worker is compensated at a rate of not less than one and a half times the basic rate of pay for all hours worked in excess of 40 hours in the work week. The requirements of 40 U.S.C. 3704 are applicable to construction work and provide that no laborer or mechanic must be required to work in surroundings or under working conditions which are unsanitary, hazardous or dangerous. These requirements do not apply to the purchases of supplies or materials or articles ordinarily available on the open market, or contracts for transportation or transmission of intelligence.
- J. Rights to Inventions Made Under a Contract or Agreement: If the Federal award meets the definition of "funding agreement" under 37 CFR §401.2 (a) and Contractor wishes to enter into a contract with a small business firm or nonprofit organization regarding the substitution of parties, assignment or performance of experimental, developmental, or research work under that "funding agreement," Contractor agrees to comply with the requirements of 37 CFR Part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.
- K. Clean Air Act (42 U.S.C. 7401-7671q.) and the Federal Water Pollution Control Act (33 U.S.C. 1251-1387) Compliance: The Contractor certifies that during the term of an award for all contracts by P-GSD resulting from this procurement process in excess of \$150,000.00, the Contractor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act as amended (33 U.S.C. 1251- 1387). Violations must be reported to the Federal awarding agency and the Regional Office of the Environmental Protection Agency (EPA).
- L. Domestic preferences for procurements: As appropriate and to the extent consistent with law, the Contractor shall, to the greatest extent practicable under a Federal

award, provide a preference for the purchase, acquisition, or use of goods, products, or materials produced in the United States (including but not limited to iron, aluminum, steel, cement, and other manufactured products). The requirements of this section must be included in all subawards including all contracts, subcontracts, and purchase orders for work or products under this award. For purposes of this section:

- 1) "Produced in the United States" means, for iron and steel products, that all manufacturing processes, from the initial melting stage through the application of coatings, occurred in the United States.
- 2) "Manufactured products" means items and construction materials composed in whole or in part of non-ferrous metals such as aluminum; plastics and polymer-based products such as polyvinyl chloride pipe; aggregates such as concrete; glass, including optical fiber; and lumber.

M. Debarment and Suspension: Contractor certifies that during the term of an award for all contracts by P-GSD resulting from this procurement process, the Contractor certifies that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation by any federal department or agency.

N. Compliance with Byrd Anti-Lobbying Amendment (31 U.S.C. 1352): When federal funds are expended by P-GSD for an award exceeding \$100,000, the Contractor certifies that during the term and after the awarded term of an award for all contracts by P-GSD resulting from this procurement process, the vendor certifies that it is in compliance with all applicable provisions of the Byrd Anti-Lobbying Amendment (31 U.S.C. 1352). The Contractor further certifies that:

- 1) No Federal appropriated funds have been paid or will be paid for on behalf of the Contractor, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with the awarding of a Federal contract, the making of a Federal grant, the making of a Federal loan, the entering into a cooperative agreement, and the extension, continuation, renewal, amendment, or modification of a Federal contract, grant, loan, or cooperative agreement.
- 2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of congress, or an employee of a Member of Congress in connection with this Federal grant or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying", in accordance with its instructions.
- 3) The Contractor shall require that the language of this certification be included in the award documents for all covered sub-awards exceeding \$100,000 in Federal funds at all appropriate tiers and that all subrecipients shall certify and disclose accordingly.

- O. Records Retention Requirements: The Contractor certifies that it will comply with the record retention requirements detailed in 2 CFR § 200.333. The Contractor further certifies that Contractor will retain all records as required by 2 CFR § 200.333 for a period of three years after grantees or subgrantees submit final expenditure reports or quarterly or annual financial reports, as applicable, and all other pending matters are closed.
- P. Certification of Compliance with EPA Regulations: For a contract in excess of \$100,000, the Contractor certifies that the Contractor is in compliance with all applicable standards, orders, regulations, and/or requirements issued pursuant to the Clean Air Act of 1970, as amended (42 U.S.C. 1857(h)), Section 508 of the Clean Water Act, as amended (33 U.S.C. 1368), Executive Order 117389 and Environmental Protection Agency Regulation, 40 CFR Part 15.
- Q. Certification of Compliance with Energy Policy and Conservation Act: Contractor certifies that the Contractor will be in compliance with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94-163, 89 Stat. 871).
- R. Certification of Non-Collusion Statement: Contractor certifies under penalty of perjury that its response to this procurement solicitation is in all respects bona fide, fair, and made without collusion or fraud with any person, joint venture, partnership, corporation or other business or legal entity.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **008100**



**SECTION 008200 - PREVAILING WAGE RATE REQUIREMENTS****PART 1 - GENERAL****1.1 PREVAILING WAGE REQUIREMENTS (DAVIS-BACON ACT)**

- A. As also stated in SECTION 008100: *During the term of an award for all contracts and subgrants for construction or repair, the Contractor certifies it will be in compliance with all applicable Davis-Bacon Act provisions. In accordance with the statute, contractors must be required to pay wages to laborers and mechanics at a rate not less than the prevailing wages specified in a wage determination made by the Secretary of Labor. In addition, contractors must be required to pay wages not less than once a week. P-GSD will report all suspected or reported violations to the Federal awarding agency.*
- B. All construction work on the project is covered the Davis-Bacon labor standards. Contractors and subcontractors shall pay laborers and mechanics employed by contractors and employed directly upon the site of the work at a minimum the prevailing wages as attached to this Section.
- C. Contractors and subcontractors on covered projects must pay all laborers and mechanics weekly and submit certified payroll records which cover a weekly payroll basis. Payroll reports shall be submitted with each month's Application for Payment or at an interval otherwise agreed upon by the Owner, Architect, and Contractor; one (1) original (signed in blue ink) and two (2) copies. Also refer to Wage Decision and Payroll Reporting Form(s) attached to this section which includes the following:
1. Wage Decision No. MS20230052 06/02/2023 (provided for Contractor use; do not include with monthly Application for Payment).
  2. WH-347 US Department of Labor Payroll Reporting Form
- D. Instructions For Completing Payroll Form, WH-347
1. **General:** Form WH-347 has been made available for the convenience of contractors and subcontractors required by their Federal or Federally-aided construction-type contracts and subcontracts to submit weekly payrolls. Properly filled out, this form will satisfy the requirements of Regulations, Parts 3 and 5 (29 C.F.R., Subtitle A), as to payrolls submitted in connection with contracts subject to the Davis-Bacon and related Acts.

While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) requires contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each

employee during the preceding week." U.S. Department of Labor (DOL) Regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

Under the Davis-Bacon and related Acts, the contractor is required to pay not less than prevailing wage, including fringe benefits, as predetermined by the Department of Labor. The contractor's obligation to pay fringe benefits may be met either by payment of the fringe benefits to bona fide benefit plans, funds or programs or by making payments to the covered workers (laborers and mechanics) as cash in lieu of fringe benefits.

This payroll provides for the contractor to show on the face of the payroll all monies to each worker, whether as basic rates or as cash in lieu of fringe benefits, and provides for the contractor's representation in the statement of compliance on the payroll (as shown on page 2) that he/she is paying for fringe benefits required by the contract and not paid as cash in lieu of fringe benefits. Detailed instructions concerning the preparation of the payroll follow:

2. **Contractor or Subcontractor:** Fill in your firm's name and check appropriate box.
3. **Address:** Fill in your firm's address.
4. **Payroll No.:** Beginning with the number "1", list the payroll number for the submission.
5. **For Week Ending:** List the workweek ending date.
6. **Project and Location:** Self-explanatory.
7. **Project or Contract No.:** Self-explanatory.
8. **Column 1 - Name and Individual Identifying Number of Worker:** Enter each worker's full name and an individual identifying number (e.g., last four digits of worker's social security number) on each weekly payroll submitted.
9. **Column 2 - No. of Withholding Exemptions:** This column is merely inserted for the employer's convenience and is not a requirement of Regulations, Part 3 and 5.
10. **Column 3 - Work Classifications:** List classification descriptive of work actually performed by each laborer or mechanic. Consult classification and minimum wage schedule set forth in contract specifications. If additional classifications are deemed necessary, see Contracting Officer or Agency representative. An individual may be shown as having worked in more than one classification provided an accurate breakdown or hours worked in each classification is maintained and shown on the submitted payroll by use of separate entries.

11. **Column 4 - Hours worked:** List the day and date and straight time and overtime hours worked in the applicable boxes. On all contracts subject to the Contract Work Hours Standard Act, enter hours worked in excess of 40 hours a week as "overtime".
12. **Column 5 - Total:** Self-explanatory
13. **Column 6 - Rate of Pay (Including Fringe Benefits):** In the "straight time" box for each worker, list the actual hourly rate paid for straight time worked, plus cash paid in lieu of fringe benefits paid. When recording the straight time hourly rate, any cash paid in lieu of fringe benefits may be shown separately from the basic rate. For example, "\$12.25/.40" would reflect a \$12.25 base hourly rate plus \$0.40 for fringe benefits. This is of assistance in correctly computing overtime. See "Fringe Benefits" below. When overtime is worked, show the overtime hourly rate paid plus any cash in lieu of fringe benefits paid in the "overtime" box for each worker; otherwise, you may skip this box. See "Fringe Benefits" below. Payment of not less than time and one-half the basic or regular rate paid is required for overtime under the Contract Work Hours Standard Act of 1962 if the prime contract exceeds \$100,000. In addition to paying no less than the predetermined rate for the classification which an individual works, the contractor must pay amounts predetermined as fringe benefits in the wage decision made part of the contract to approved fringe benefit plans, funds or programs or shall pay as cash in lieu of fringe benefits. See "FRINGE BENEFITS" below.
14. **Column 7 - Gross Amount Earned:** Enter gross amount earned on this project. If part of a worker's weekly wage was earned on projects other than the project described on this payroll, enter in column 7 first the amount earned on the Federal or Federally assisted project and then the gross amount earned during the week on all projects, thus "\$163.00/\$420.00" would reflect the earnings of a worker who earned \$163.00 on a Federally assisted construction project during a week in which \$420.00 was earned on all work.
15. **Column 8 - Deductions:** Five columns are provided for showing deductions made. If more than five deduction are involved, use the first four columns and show the balance deductions under "Other" column; show actual total under "Total Deductions" column; and in the attachment to the payroll describe the deduction(s) contained in the "Other" column. All deductions must be in accordance with the provisions of the Copeland Act Regulations, 29 C.F.R., Part 3. If an individual worked on other jobs in addition to this project, show actual deductions from his/her weekly gross wage, and indicate that deductions are based on his gross wages.
16. **Column 9 - Net Wages Paid for Week:** Self-explanatory.
17. **Totals** - Space has been left at the bottom of the columns so that totals may be shown if the contractor so desires.
18. **Statement Required by Regulations, Parts 3 and 5:** While the "statement of compliance" need not be notarized, the statement (on page 2 of the payroll form) is subject to the penalties provided by 18 U.S.C. § 1001, namely, a fine, possible

imprisonment of not more than 5 years, or both. Accordingly, the party signing this statement should have knowledge of the facts represented as true.

19. **Items 1 and 2:** Space has been provided between items (1) and (2) of the statement for describing any deductions made. If all deductions made are adequately described in the "Deductions" column above, state "See Deductions column in this payroll." See "FRINGE BENEFITS" below for instructions concerning filling out paragraph 4 of the statement.
20. **Item 4 FRINGE BENEFITS - Contractors who pay all required fringe benefits:** If paying all fringe benefits to approved plans, funds, or programs in amounts not less than were determined in the applicable wage decision of the Secretary of Labor, show the basic cash hourly rate and overtime rate paid to each worker on the face of the payroll and check paragraph 4(a) of the statement on page 2 of the WH-347 payroll form to indicate the payment. Note any exceptions in section 4(c).
21. **Contractors who pay no fringe benefits:** If not paying all fringe benefits to approved plans, funds, or programs in amounts of at least those that were determined in the applicable wage decision of the Secretary of Labor, pay any remaining fringe benefit amount to each laborer and mechanic and insert in the "straight time" of the "Rate of Pay" column of the payroll an amount not less than the predetermined rate for each classification plus the amount of fringe benefits determined for each classification in the application wage decision. Inasmuch as it is not necessary to pay time and a half on cash paid in lieu of fringe benefits, the overtime rate shall be not less than the sum of the basic predetermined rate, plus the half time premium on basic or regular rate, plus the required cash in lieu of fringe benefits at the straight time rate. In addition, check paragraph 4(b) of the statement on page 2 the payroll form to indicate the payment of fringe benefits in cash directly to the workers. Note any exceptions in section 4(c).
22. **Use of Section 4(c), Exceptions**

Any contractor who is making payment to approved plans, funds, or programs in amounts less than the wage determination requires is obliged to pay the deficiency directly to the covered worker as cash in lieu of fringe benefits. Enter any exceptions to section 4(a) or 4(b) in section 4(c). Enter in the Exception column the craft, and enter in the Explanation column the hourly amount paid each worker as cash in lieu of fringe benefits and the hourly amount paid to plans, funds, or programs as fringe benefits. The contractor must pay an amount not less than the predetermined rate plus cash in lieu of fringe benefits as shown in section 4(c) to each such individual for all hours worked (unless otherwise provided by applicable wage determination) on the Federal or Federally assisted project. Enter the rate paid and amount of cash paid in lieu of fringe benefits per hour in column 6 on the payroll. See paragraph on "Contractors who pay no fringe benefits" for computation of overtime rate.



1.2 ATTACHMENTS TO THIS SECTION

- A. Wage Decision No. MS20230052 06/02/2023 (6 pages)
- B. Fact Sheet #66: The Davis-Bacon and Related Acts (DBRA) (2 pages)
- C. WH-347 Payroll Reporting Form (2 pages)
- D. WH-347 Poster for Jobsite (1 page)

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **008200**



"General Decision Number: MS20230052 06/02/2023

Superseded General Decision Number: MS20220052

State: Mississippi

Construction Type: Building

BUILDING CONSTRUCTION PROJECTS (does not include single family homes or apartments up to and including 4 stories).

County: Jackson County in Mississippi.

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(2)-(60).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least \$16.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2023.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least \$12.15 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2023.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/06/2023
1	01/27/2023
2	02/10/2023
3	04/07/2023
4	06/02/2023

CARP0318-001 09/01/2016

	Rates	Fringes
CARPENTER (Includes Drywall Hanging, Finishing/Taping and Form Work).....	\$ 24.11	10.60

ELEC0903-012 01/01/2022

	Rates	Fringes
ELECTRICIAN (Includes Low Voltage Wiring).....	\$ 29.20	6.68+9.50%

ENGI0624-007 01/01/2017

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Crane.....	\$ 26.20	12.30
Forklift.....	\$ 26.20	12.30

IRON0798-009 10/01/2022

	Rates	Fringes
IRONWORKER, REINFORCING.....	\$ 28.50	17.02

\* PLUM0568-007 11/01/2021

	Rates	Fringes
PIPEFITTER (Includes HVAC Unit Installation (Excludes HVAC Pipe Installation)).....	\$ 27.91	10.57
PLUMBER (Includes HVAC Pipe Installation (Excludes HVAC Unit Installation)).....	\$ 27.11	10.02

SFMS0669-001 04/01/2023

	Rates	Fringes
SPRINKLER FITTER (Fire Sprinkler).....	\$ 28.36	22.38

SHEE0441-006 07/01/2022

	Rates	Fringes
SHEET METAL WORKER (Includes HVAC Duct Installation).....	\$ 30.45	13.88

\* SUMS2015-013 04/03/2017

	Rates	Fringes
BRICKLAYER.....	\$ 20.29	0.00
CEMENT MASON/CONCRETE FINISHER...	\$ 18.37	0.00
IRONWORKER, STRUCTURAL.....	\$ 18.05	0.00
LABORER: Common or General.....	\$ 13.57 **	0.00
LABORER: Mason Tender - Cement/Concrete.....	\$ 12.50 **	0.00
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 17.89	1.62
OPERATOR: Bulldozer.....	\$ 15.14 **	1.03
PAINTER (Brush and Roller).....	\$ 17.00	0.00
ROOFER.....	\$ 14.50 **	0.00
TILE SETTER.....	\$ 18.00	0.00
TRUCK DRIVER: Dump Truck.....	\$ 14.11 **	0.27

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

=====  
 \*\* Workers in this classification may be entitled to a higher minimum wage under Executive Order 14026 (\$16.20) or 13658 (\$12.15). Please see the Note at the top of the wage determination for more information.

Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at <https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

#### Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

#### Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

#### Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage

determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.

Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISIO"



## Fact Sheet #66: The Davis-Bacon and Related Acts (DBRA)

This fact sheet provides general information concerning DBRA.

### Coverage

DBRA requires payment of prevailing wages on federally funded or assisted construction projects. The [Davis-Bacon Act](#) applies to each federal government or District of Columbia contract in excess of \$2,000 for the construction, alteration, or repair (including painting and decorating) of [public buildings or public works](#). Many federal laws that authorize federal assistance for construction through grants, loans, loan guarantees, and insurance are Davis-Bacon “related Acts.” The “related Acts” include provisions that require Davis-Bacon labor standards apply to most federally assisted construction. Examples of “related Acts” include the Federal-Aid Highway Acts, the Housing and Community Development Act of 1974, and the Federal Water Pollution Control Act.

### Basic Provisions/Requirements

Contractors and subcontractors must pay [laborers and mechanics employed](#) directly upon the [site of the work](#) at least the locally prevailing wages (including fringe benefits), listed in the Davis-Bacon wage determination in the contract, for the work performed. [Davis-Bacon labor standards clauses](#) must be included in covered contracts.

The Davis-Bacon “prevailing wage” is the combination of the basic hourly rate and any fringe benefits listed in a Davis-Bacon wage determination. The contractor’s obligation to pay at least the prevailing wage listed in the contract wage determination can be met by paying each laborer and mechanic the applicable prevailing wage entirely as cash wages or by a combination of cash wages and employer-provided bona fide fringe benefits. Prevailing wages, including fringe benefits, must be paid on all hours worked on the site of the work.

Apprentices or trainees may be employed at less than the rates listed in the contract wage determination only when they are in an apprenticeship program registered with the Department of Labor or with a state apprenticeship agency recognized by the Department.

Contractors and subcontractors are required to pay covered workers weekly and submit weekly certified payroll records to the contracting agency. They are also required to post the applicable Davis-Bacon wage determination with the [Davis-Bacon poster \(WH-1321\)](#) on the job site in a prominent and accessible place where they can be easily seen by the workers.

### Davis-Bacon Wage Determinations

Davis-Bacon wage determinations are published on the Wage Determinations On Line website at <https://beta.SAM.gov> for contracting agencies to incorporate them into covered contracts. The “prevailing wages” are determined based on wages paid to various classes of laborers and mechanics employed on specific types of construction projects in an area. Guidance on determining the type of construction is provided in All Agency Memoranda [Nos. 130](#) and [131](#).

## **Penalties/Sanctions and Appeals**

Contract payments may be withheld in sufficient amounts to satisfy liabilities for underpayment of wages and for liquidated damages for overtime violations under the Contract Work Hours and Safety Standards Act (CWHSSA). In addition, violations of the Davis-Bacon contract clauses may be grounds for contract termination, contractor liability for any resulting costs to the government and debarment from future contracts for a period up to three years.

Contractors and subcontractors may challenge determinations of violations and debarment before an Administrative Law Judge (ALJ). Interested parties may appeal ALJ decisions to the Department's Administrative Review Board. Final Board determinations on violations and debarment may be appealed to and are enforceable through the federal courts.

## **Typical Problems**

(1) Misclassification of laborers and mechanics. (2) Failure to pay full prevailing wage, including fringe benefits, for all hours worked (including overtime hours). (3) Inadequate recordkeeping, such as not counting all hours worked or not recording hours worked by an individual in two or more classifications during a day. (4) Failure of to maintain a copy of bona fide apprenticeship program and individual registration documents for apprentices. (5) Failure to submit certified payrolls weekly. (6) Failure to post the Davis-Bacon poster and applicable wage determination.

## **Relation to State, Local, and Other Federal Laws**

The [Copeland "Anti-Kickback" Act](#) prohibits contractors from in any way inducing an employee to give up any part of the compensation to which he or she is entitled under his or her contract of employment, and requires contractors to submit a weekly statement of the wages paid to each employee performing DBRA covered work.

Contractors on projects subject to DBRA labor standards may also be subject to additional prevailing wage and overtime pay requirements under State (and local) laws. Also, overtime work pay requirements under CWHSSA) and the [Fair Labor Standards Act](#) may apply.

Under [Reorganization Plan No. 14 of 1950](#), (5 U.S.C.A. Appendix), the federal contracting or assistance-administering agencies have day-to-day responsibility for administration and enforcement of the Davis-Bacon labor standards provisions and, in order to promote consistent and effective enforcement, the Department of Labor has regulatory and oversight authority, including the authority to investigate compliance.

## **Where to Obtain Additional Information**

**For additional information, visit our Wage and Hour Division Website: <http://www.wagehour.dol.gov> and/or call our toll-free information and helpline, available 8 a.m. to 5 p.m. in your time zone, 1-866-4USWAGE (1-866-487-9243).**

This publication is for general information and is not to be considered in the same light as official statements of position contained in the regulations.

**U.S. Department of Labor**  
Frances Perkins Building  
200 Constitution Avenue, NW  
Washington, DC 20210

**1-866-4-USWAGE**  
TTY: 1-866-487-9243  
[Contact Us](#)

**PAYROLL**

(For Contractor's Optional Use; See Instructions at [www.dol.gov/whd/forms/wh347instr.htm](http://www.dol.gov/whd/forms/wh347instr.htm))



Rev. Dec. 2008

Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number.

NAME OF CONTRACTOR <input type="checkbox"/> OR SUBCONTRACTOR <input type="checkbox"/>	ADDRESS	OMB No.:1235-0008 Expires: 04/30/2021
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PAYROLL NO.	FOR WEEK ENDING	PROJECT AND LOCATION	PROJECT OR CONTRACT NO.
-------------	-----------------	----------------------	-------------------------

(1) NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	(2) NO. OF WITHHOLDING EXEMPTIONS	(3) WORK CLASSIFICATION	OT OR ST.	(4) DAY AND DATE							(5) TOTAL HOURS	(6) RATE OF PAY	(7) GROSS AMOUNT EARNED	(8) DEDUCTIONS					(9) NET WAGES PAID FOR WEEK
				HOURS WORKED EACH DAY										FICA	WITH- HOLDING TAX	OTHER	TOTAL DEDUCTIONS		
			O																
			S																
			O																
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While completion of Form WH-347 is optional, it is mandatory for covered contractors and subcontractors performing work on Federally financed or assisted construction contracts to respond to the information collection contained in 29 C.F.R. §§ 3.3, 5.5(a). The Copeland Act (40 U.S.C. § 3145) contractors and subcontractors performing work on Federally financed or assisted construction contracts to "furnish weekly a statement with respect to the wages paid each employee during the preceding week." U.S. Department of Labor (DOL) regulations at 29 C.F.R. § 5.5(a)(3)(ii) require contractors to submit weekly a copy of all payrolls to the Federal agency contracting for or financing the construction project, accompanied by a signed "Statement of Compliance" indicating that the payrolls are correct and complete and that each laborer or mechanic has been paid not less than the proper Davis-Bacon prevailing wage rate for the work performed. DOL and federal contracting agencies receiving this information review the information to determine that employees have received legally required wages and fringe benefits.

**Public Burden Statement**

We estimate that it will take an average of 55 minutes to complete this collection, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. If you have any comments regarding these estimates or any other aspect of this collection, including suggestions for reducing this burden, send them to the Administrator, Wage and Hour Division, U.S. Department of Labor, Room S3502, 200 Constitution Avenue, N.W. Washington, D.C. 20210

Date \_\_\_\_\_

I, \_\_\_\_\_  
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by

\_\_\_\_\_ on the  
(Contractor or Subcontractor)

\_\_\_\_\_;  
(Building or Work)

\_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_, and ending the \_\_\_\_\_ day of \_\_\_\_\_, \_\_\_\_\_,  
all persons employed on said project have been paid the full weekly wages earned, that no rebates have  
been or will be made either directly or indirectly to or on behalf of said

\_\_\_\_\_ from the full  
(Contractor or Subcontractor)

weekly wages earned by any person and that no deductions have been made either directly or indirectly  
from the full wages earned by any person, other than permissible deductions as defined in Regulations, Part  
3 (29 C.F.R. Subtitle A), issued by the Secretary of Labor under the Copeland Act, as amended (48 Stat. 948,  
63 Stat. 108, 72 Stat. 967; 76 Stat. 357; 40 U.S.C. § 3145), and described below:

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

(2) That any payrolls otherwise under this contract required to be submitted for the above period are  
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the  
applicable wage rates contained in any wage determination incorporated into the contract; that the classifications  
set forth therein for each laborer or mechanic conform with the work he performed.

(3) That any apprentices employed in the above period are duly registered in a bona fide apprenticeship  
program registered with a State apprenticeship agency recognized by the Bureau of Apprenticeship and  
Training, United States Department of Labor, or if no such recognized agency exists in a State, are registered  
with the Bureau of Apprenticeship and Training, United States Department of Labor.

(4) That:

(a) WHERE FRINGE BENEFITS ARE PAID TO APPROVED PLANS, FUNDS, OR PROGRAMS

- in addition to the basic hourly wage rates paid to each laborer or mechanic listed in  
the above referenced payroll, payments of fringe benefits as listed in the contract  
have been or will be made to appropriate programs for the benefit of such employees,  
except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

- Each laborer or mechanic listed in the above referenced payroll has been paid,  
as indicated on the payroll, an amount not less than the sum of the applicable  
basic hourly wage rate plus the amount of the required fringe benefits as listed  
in the contract, except as noted in section 4(c) below.

(c) EXCEPTIONS

EXCEPTION (CRAFT)	EXPLANATION

REMARKS:

NAME AND TITLE	SIGNATURE

THE WILLFUL FALSIFICATION OF ANY OF THE ABOVE STATEMENTS MAY SUBJECT THE CONTRACTOR OR  
SUBCONTRACTOR TO CIVIL OR CRIMINAL PROSECUTION. SEE SECTION 1001 OF TITLE 18 AND SECTION 231 OF TITLE  
31 OF THE UNITED STATES CODE.

# EMPLOYEE RIGHTS

## UNDER THE DAVIS-BACON ACT

### FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

#### PREVAILING WAGES

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

#### OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

#### ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

#### APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

#### PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor's Wage and Hour Division.



WAGE AND HOUR DIVISION  
UNITED STATES DEPARTMENT OF LABOR

1-866-487-9243  
TTY: 1-877-889-5627  
[www.dol.gov/whd](http://www.dol.gov/whd)



WH1321 REV 10/17

**REDUCED FROM ORIGINAL SIZE OF 11"x17"**



**SECTION 011000 - SUMMARY****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY****A. Section Includes:**

1. Project information.
2. Work covered by Contract Documents and Phased construction.
3. Work By Owner and Work Under Other Contracts.
4. Access to site.
5. Coordination with occupants.
6. Work restrictions.
7. Specification and drawing conventions.

**B. Related Requirements:**

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

**1.3 PROJECT INFORMATION**

- A. Project Identification; 22050.01 Gautier Elementary School Kitchen Renovation (RE-BID)

**1. Project Location:**

- a. Gautier Elementary School  
505 Magnolia Tree Drive  
Gautier, MS 39553

- B. Owner: Pascagoula-Gautier School District, 1006 Communy Avenue, Pascagoula, MS 39568.
- C. Architect: JBHM Architects, 308 East Pearl Street, Suite 300, Jackson, MS 39201.  
Phone: 601-352-2699.
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Foodservice Consultant: Murray-Corban Consultants
  2. Structural Engineer: Structural Design Group
  3. Mechanical Engineer: GSK Mechanical, Inc
  4. Electrical Engineer: MP Design Group (Machado | Patano, PLLC)
- E. Contractor: To be awarded the project via competitive bid ("lowest and best" selection).
- F. Project Web Site: A project Web site administered by Architect will be used for purposes of managing communication and documents during the construction stage.
1. See Section 013100 "Project Management and Coordination." for requirements for using the Project Web site

#### 1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and generally consists of the following:
1. Gautier Elementary School, Kitchen Renovation:
    - a. Renovation of the Existing Cafeteria and Kitchen areas.
- B. The work includes selective demolition of the existing facilities, cast in place concrete, structural steel framing and decking, steel joists, rough carpentry and sheathing, sbs-modified bituminous membrane roofing, roof accessories, hollow metal doors and frames, flush wood doors, gypsum board assemblies, acoustical panel ceilings, floor-and wall-tiling, toilet compartments and accessories, foodservice equipment, plumbing work, mechanical work, and electrical work.
- C. Type of Contract and Work Sequence:
1. Project will be constructed under a single prime contract.
  2. As stated in Section 004200 Proposal Form, the anticipated effective date of the Notice to Proceed is September 25, 2023. The entire work shall be completed in two hundred and eighty (280) consecutive calendar days. Therefore, the specified date of substantial completion shall be July 1, 2024.

#### 1.5 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. The Owner will disconnect and remove all existing computers and "technology items" from the work areas and will store these off-site, or in an area to be secured by the Pascagoula-Gautier School District.



## 1.6 WORK UNDER OTHER CONTRACTS

- A. **Separate Contract:** The Owner may award separate contracts for performance of certain construction operations at the site. Those operations will be conducted simultaneously with work under this Contract. That Contract may include the following:
1. Foodservice Equipment.
  2. Furniture, Furnishings, and Equipment.
  3. Security, Surveillance, and Access Control System Installation / Modification.
  4. Audio/Visual and Classroom Instructional Technology systems.
- B. Should the Owner award separate contracts, cooperate fully with separate contractors so that work under those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

## 1.7 ACCESS TO SITE

- A. **General:** Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.
- B. **Use of Site:** Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
1. **Limits:** Confine construction operations to areas shown in the construction drawings noted Project Site.
  2. **Driveways, Walkways and Entrances:** Keep driveways 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.
    - c. All materials and equipment shall be brought onto the site by making use of such roadways and drives as designated by the Owner and Architect and across the grounds along routes established by the Owner and Architect.
    - d. Any streets, roadways, sidewalks, grounds, plantings, trees, or other property that may be damaged as a result of the contract work shall be properly repaired or fully replaced by the contractor to the full satisfaction of all interests involved.
    - e. No more space that is absolutely necessary will be permitted to be used on the grounds immediately around a construction site, and the contractor must use every care against damage to the grounds. The entire site, upon completion of the project, shall be left in the same state as found to exist at the start of the work.

- C. From the start of the work until the entire completion of the work, the Contractor shall keep on hand an adequate crew of laborers and/or other personnel to keep the entire building and surrounding streets, sidewalks, alleys, etc., free from any dirt, rubbish, and other debris resulting from the execution of this contract. It shall be the responsibility of each individual prime contractor to remove all such debris from the building and site on a daily basis. At all times, the site of the work shall present a neat, orderly, and workmanlike appearance.
- D. If sufficient parking area is not available within the designated storage and working area for the vehicles of workmen employed on the building, the contractor shall require workmen to park their vehicles in area designated by the Owner and Architect. Workmen failing to comply with traffic and parking regulation of the school shall be removed from the job at the request of the proper school officials.
- E. The contractor will manage the work of this contract in such a manner as to not unnecessarily interfere with the normal school operations. The contractor expressly undertakes at his own expense to comply with the regulations governing the operations of premises which are occupied and to perform his contract in such a manner as not to interrupt or interfere with the operation of the school and to perform after working hours, or on Sunday or regular holidays without additional expense to the Owner, any work necessary to comply with this stipulation.
- F. Contractor shall coordinate any and all after-hours work with the Owner in the event of a school activity at the facility (PTA Meeting, Open House, Athletic Event, etc.).
- G. The Owner will not be responsible for the safety of the Contractor's work, materials, or equipment. Protection of the property within the contract work area both day and night shall be the responsibility of the Contractor.
- H. Signs, lights, barricades, covered walkways, signals, fences, etc., shall be utilized night and day to protect students and personnel on the campus.
- I. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

## 1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.

3. Take all precautions necessary to protect the building and its occupants during the construction period.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.
- C. The Owner will box up the contents of each individual room in which work is to be performed (classroom textbooks, supplies, decorations, displays, teaching aids, etc.), label each box as to room location, and leave the packed boxes in each individual room. Contractor is responsible for removing and/or staging all boxes, student/computer desks, library bookshelves, and other furniture existing in the work areas so as to protect all items from damage and allow construction to proceed. Storage solution options include, but are not limited to:
1. On-site, secure storage containers provided by the Contractor are acceptable; however Contractor is responsible for protecting all items from damage.
  2. Off-site, secure, and climate-controlled temporary storage.
  3. Staging and covering items throughout the existing building, phasing the work so as to allow this.
- D. Contractor shall be prepared to discuss proposed storage method during the Pre-Construction Conference.
- E. Contractor shall inventory and tag all existing window blinds, tag, remove, store, and protect from damage during construction, and re-install at substantial completion of each phase.
- 1.9 WORK RESTRICTIONS
- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. From full Notice to Proceed, the Contractor will have 24-hour access to all work areas, subject to the terms and conditions of the Contract and as permitted by code and local ordinance / authorities having jurisdiction.

2. Do not disturb portions of the site or existing buildings beyond the areas in which the Work is indicated. Limit use of the premises and confine operations to areas in which the Work is indicated.
  3. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: No designated limits, other than coordination with the Owner as noted herein.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
  2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
  2. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.
- F. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Objectionable Workmen: Any workman who may, because of improper conduct, become objectionable will be promptly removed by the Contractor at the request of the Owner and/or Architect:
1. Firearms of any kind are not allowed on school grounds. Possession on school grounds constitutes non-compliance.
  2. The possession or consumption of alcoholic beverages is forbidden on school grounds.
  3. The use of tobacco products inside any facility is prohibited.
  4. The Contractor shall comply with the Owner's alcohol-free, drug-free, tobacco-free, harassment-free and weapon-free policies and shall require compliance with those policies by Contractor's employees, subcontractors.
  5. Shirts and pants shall be worn by all workers at all times.
  6. The use of offensive language or gestures towards any person will not be tolerated, and is subject to being removed from the job site.
  7. Any workman who may, because of improper conduct, become objectionable shall be promptly removed by the contractor, at the request of the Owner.
  8. Any sex offender is prohibited from working or volunteering at any child care

services.

- I. From the start of the work until the entire completion of the work, the Contractor shall keep on hand an adequate crew of laborers and/or other personnel to keep the work areas and site free from any dirt, rubbish, and other debris resulting from the execution of this contract. Remove all such debris from the building and site on a daily basis. At all times, the site of the work shall present a neat, orderly, and workmanlike appearance.

#### 1.10 SPECIFICATION AND DRAWING CONVENTIONS

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

#### 1.11 FLOOD ELEVATION CERTIFICATES

- A. Contractor shall include the services of a licensed professional surveyor in order to furnish Elevation Certificates (on a form approved by FEMA) that verify that all exterior improvements (including but not limited to mechanical and electrical equipment, pads, slabs, etc.) comply with the floodplain ordinance and floodplain permit requirements..
- B. It is believed that the Project Site is partially located in an "AE" flood zone with a Base Flood Elevation (BFE) Requirement of 14.0 feet (AE-14), and that the City of Gautier requires a minimum 1'-0" freeboard. As such, all exterior improvements shall be located at a minimum elevation of 15.0 feet.
- C. Three Elevation Certificate submittals are required for this project:

1. Construction Drawings / Pre-Construction (shall be obtained and submitted to the City of Gautier as part of the building permit application).
2. Building Under Construction.  
Finished Construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **011000**

**SECTION 012100 - ALLOWANCES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Lump-sum allowances.
  - 2. Unit-cost allowances.
  - 3. Contingency allowances.

**1.3 SELECTION AND PURCHASE**

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

**1.4 ACTION SUBMITTALS**

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

## 1.5 INFORMATIONAL SUBMITTALS

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

## 1.6 COORDINATION

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

## 1.7 LUMP-SUM UNIT-COST AND QUANTITY ALLOWANCES

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

## 1.8 CONTINGENCY ALLOWANCES

- A. Use the contingency allowance only as directed by Architect for Owner's purposes and only by Construction Change Directives that indicate amounts to be charged to the allowance.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, General Contractor's overhead, profit, tax, insurance, bonds, and other similar costs related to products and materials ordered by the Owner or selected by the Architect under allowance shall be included as part of the Contract Sum and not be part of the allowance.



- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

## 1.9 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1 Contingency Allowance: Include a contingency allowance of **\$75,000.00** for use according to the Owner's written instructions.

- B. Allowance No. 2 Door Hardware: Include the lump sum of **\$12,000.00** for the purchase and delivery of door hardware. Installation of same shall be included in the base bid.
- C. Allowance No. 3 Utilities for Temporary Foodservice Equipment: Include the lump sum of **\$20,000.00** to provide misc. utility connections/infrastructure for a temporary food warmer, cooler, and serving line

END OF SECTION **012100**

## SECTION 012500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 DEFINITIONS

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

#### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided in Project Manual.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and

- separate contractors, that will be necessary to accommodate proposed substitution.
- c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. 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.
  - j. Cost information, including a proposal of change, if any, in the Contract Sum.
  - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within ten days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 <Insert number> days of receipt of request, or ten days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not accept the proposed substitute .

## 1.5 PROCEDURES

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

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 <Insert days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.
    - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

- d. Substitution request is fully documented and properly submitted.
- e. Requested substitution will not adversely affect Contractor's construction schedule.
- f. Requested substitution has received necessary approvals of authorities having jurisdiction.
- g. Requested substitution is compatible with other portions of the Work.
- h. Requested substitution has been coordinated with other portions of the Work.
- i. Requested substitution provides specified warranty.
- j. 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION **012500**

“OR EQUAL” SUBSTITUTION

SR #: \_\_\_\_\_

TO: \_\_\_\_\_

PROJECT: \_\_\_\_\_

SPECIFIED ITEM: \_\_\_\_\_

Section	Page	Paragraph	Description
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The undersigned requests consideration of the following:

PROPOSED "OR EQUAL" SUBSTITUTION

Attached data includes product data and description, specifications, shop drawings, photographs, certified performance and test results adequate for evaluation of the request; applicable portions of the data are clearly identified.

Attached data also includes a description of changes to the Contract Documents which the proposed substitution or "or equal" will require for its proper installation. Acceptance of the proposed "or equal" substitution will require the following changes:

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

The undersigned certifies that the following paragraphs, unless modified by attachments are correct:

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

1. The proposed "or equal" substitution does not affect dimensions shown on the drawings.
2. The undersigned will coordinate the installation of the proposed product and will make changes to other Work which may be required at no additional costs to the Owner.
3. The proposed "or equal" substitution will have no adverse affect on other trades, the construction schedule, or specified warranty requirements.

- 4. Maintenance and service parts will be locally available for the proposed "or equal" substitution.
- 5. The proposed product has been investigated and it has been determined that the function, appearance and quality of the proposed substitution are equivalent or superior to the specified item.
- 6. The same warranty is available for the proposed product as for the specified product.
- 7. Any claim for additional costs and/or time in connection with the proposed "or equal" substitution are hereby waived.
- 8. The Owner will be reimbursed for review or redesign services associated with re-approval by authorities.
- 9. Incorporation or use of the proposed "or equal" substitution in the Work \_\_\_\_ is \_\_\_\_ or is not subject to payment of any license fee or royalty.

The undersigned agrees to pay all costs that result directly or indirectly from acceptance of such "or equal" substitute, including costs of redesign and claims of other contractors affected by the resulting change.

Submitted by: \_\_\_\_\_

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

Firm: \_\_\_\_\_

Address: \_\_\_\_\_

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

Telephone: \_\_\_\_\_

Attachments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



For use by the design consultant:

\_\_\_\_\_ Accepted                      \_\_\_\_\_ Accepted as noted

\_\_\_\_\_ Not Accepted                      \_\_\_\_\_ Received too late

By: \_\_\_\_\_

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

Remarks: \_\_\_\_\_



## SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

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

#### 1.3 MINOR CHANGES IN THE WORK

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

#### 1.4 PROPOSAL REQUESTS

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

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
  7. Proposal Request Form: Use AIA Document G709, "Work Changes Proposal Request."

#### 1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 012100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

#### 1.6 CHANGE ORDER PROCEDURES

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

#### 1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **012600**



**SECTION 012900 - PAYMENT PROCEDURES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
  - 1. Section 012100 "Allowances" for procedural requirements governing the handling and processing of allowances.
  - 2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

**1.3 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
  - 1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with continuation sheets.
    - b. Submittal schedule.
    - c. Items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
  - 3. Subschedules for 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 Architect.
  - c. Architect's project number.
  - d. Contractor's name and address.
  - e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be



consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
1. All payments must be submitted to and approved by the Pascagoula-Gautier School District Board of Trustees. Board Meetings are typically held on the second Monday of each month.
  2. Submit draft copy of Application for Payment five days prior to due date for review by Architect.
  3. The Architect must receive an Application for Payment not later than the twenty-fifth (25th) day of each month, for inclusion on the Board agenda for the following month.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for

- Payment.
- c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- 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. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
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. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of values.
  3. Contractor's construction schedule (preliminary if not final).
  4. Products list (preliminary if not final).
  5. Schedule of unit prices.
  6. Submittal schedule (preliminary if not final), within 30 days of Notice To Proceed.
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **012900**



**SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Shop Drawings.
  - 4. Requests for Information (RFIs).
  - 5. Potential Change Order (PCO).
  - 6. Site Observation.
  - 7. Communication via Project Web site.
  - 8. Project meetings.

**1.3 DEFINITIONS**

- A. **REQUEST FOR INFORMATION (RFI):** Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.
- B. **POTENTIAL CHANGE ORDER (PCO):** Owner, Architect, or Contractor seeking price proposal for changes to the Work.

**1.4 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.
- B. **Key Personnel Names:** Within 30 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in

attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.

## 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
1. Preparation of Contractor's construction schedule.
  2. Preparation of the schedule of values.
  3. Installation and removal of temporary facilities and controls.
  4. Delivery and processing of submittals.
  5. Progress meetings.
  6. Preinstallation conferences.
  7. Project closeout activities.
  8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged

materials that are designated as Owner's property.

## 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally 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. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - c. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - d. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - e. Indicate required installation sequences.
    - f. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  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. Indicate areas of conflict between light fixtures and other components.
  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. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
  - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire-Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

#### 1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:



1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Form bound in Project Manual.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of

receipt of the RFI response.

- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:
  - 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of Architect.
  - 4. RFI number including RFIs that were returned without action or withdrawn.
  - 5. RFI description.
  - 6. Date the RFI was submitted.
  - 7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.
  - 1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  - 2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

#### 1.8 POTENTIAL CHANGE ORDER (PCO):

- A. General: Upon request, the contractor shall prepare and submit a PCO in the form specified.
  - 1. PCO shall include proper breakdown of materials and labor of all components with proper overhead and profit as allowed in Specification Section 002213 Supplementary Conditions.
- B. Content of PCO: Include a detailed, legible description of the breakdown per the following:
  - 1. Project name.
  - 2. Project number.
  - 3. Date.
  - 4. Name of Contractor.
  - 5. Name of Architect.
  - 6. PCO number, numbered sequentially.
  - 7. PCO subject.
  - 8. Contractor's signature.
  - 9. Attachments including breakdown.
- C. Architect's Action. Architect will review each PCO, determine action required, and respond. Allow ten (10) working days for Architect's response for each PCO. PCOs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. Architect's action may include a request for additional information, in which case the Architect's time for response will date from time of receipt of additional information.
2. Architect's action on PCOs that may result in a change to the Contract Time of the Contract Sum.

## 1.9 COMMUNICATION VIA PROJECT WEB SITE

### A. SUMMARY:

1. The following project information will be communicated electronically using web-based service Newforma:
  - a. Submittals
  - b. Request for Information (RFI)
  - c. Proposal Requests (PR)
  - d. Potential Change Orders (PCO)
  - e. Change Orders
  - f. Construction Change Directives (CCD)
  - g. Applications for Payment
  - h. Notice to Proceed (NTP)
  - i. Site Observations
2. General contractor will be given access to Newforma by the Architect at no charge.
3. The electronic submittal process is not intended for color samples, color charts, or physical material samples. These items shall be logged in to the software by the general contractor; physical samples shall then be sent to the Architect for review.
4. For project closeout, contractor shall provide one complete hard copy of all close out documents for review. Once close out documents are approved, the contractor shall provide one corrected hard copy and two thumb drives or two CD's as well as all information documented on the project web site in accordance with Specification Section 017700 Closeout Procedures.

### B. PROCEDURES

1. Electronic Submittal Preparation: Subcontractors and suppliers will not be provided access to the Newforma web site. All submittals/shop drawings shall be submitted to the general contractor, reviewed and stamped for approval, and then submitted to the Architect via Newforma.
  - a. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product dimensions and coordination of information with other parts of the work.
  - b. Architect/Engineer submittal review comments will be made available on Newforma for downloading. Contractor will receive e-mail notice of

- completed review.
- c. Distribution of reviewed submittals from subcontractors and suppliers is the responsibility of the general contractor.
- 2. Request for Information (RFI): Subcontractors and suppliers will not be provided access to the Newforma web site. All RFIs shall be submitted to the general contractor stamped "Request for Information" and then submitted by the general contractor via Newforma.
  - 3. Potential Change Orders (PCO): Subcontractors and suppliers will not be provided access to the Newforma web site. All PCOs shall be submitted via Newforma by the general contractor with complete breakdown of pricing for review and approval by the Architect.
  - 4. Observation Reports: Architectural and Engineering Reports will be issued through Newforma. Distribution to subcontractors and suppliers is the responsibility of the general contractor.

#### 1.10 PROJECT MEETINGS

- A. General: meetings and conferences at Project site unless otherwise indicated.
  - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
  - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within five days of the meeting.
- B. Preconstruction Conference: a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
  - 1. Conduct the conference to review responsibilities and personnel assignments.
  - 2. Attendees: Authorized representatives of Owner Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Designation of key personnel and their duties.
    - d. Lines of communications.
    - 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. Parking availability.
  - t. Office, work, and storage areas.
  - u. Equipment deliveries and priorities.
  - v. First aid.
  - w. Security.
  - x. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility requirements.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written instructions.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.

- r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Project Closeout Conference: a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for completing documentation.
    - e. Requirements for preparing operations and maintenance data.
    - f. Requirements for delivery of material samples, attic stock, and spare parts.
    - g. Requirements for demonstration and training.
    - h. Preparation of Contractor's punch list.
    - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - j. Submittal procedures.
    - k. Coordination of separate contracts.
    - l. Owner's partial occupancy requirements.
    - m. Installation of Owner's furniture, fixtures, and equipment.
    - n. Responsibility for removing temporary facilities and controls.
  4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

- E. Progress Meetings: Conduct progress meetings at monthly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) 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.
  4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or

recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **013100**



**FROM: General Contractor**

Address 1  
Address 2

Phone: Number  
Fax: Number

**REQUEST FOR INFORMATION**

**RFI NO:**

**DATE:**

**SUBJECT:**

**PROJECT:**

**JBHM PROJECT NO.:**  
**CONTRACTOR'S PROJECT NO.:**

**TO: JBHM Architects, P.A.**

308 East Pearl Street, Suite 300  
Jackson, MS 39201

Phone: 601.352.2699  
Fax: 601.352.2693

**REQUEST:**

**Requested by:**

**Response is needed within:      days**

**Architect's Supplemental Instructions (ASI):**

The Work shall be carried out in accordance with the following supplemental instructions issued in accordance with the Contract Documents without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgement that there will be no change in Contract Sum or Contract Time.

**Signed:**

**JBHM Response Date:**

Returned Via: E-mail  Fax  Mail

pc:



**SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for 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.
- B. Related Requirements:
  - 1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
  - 2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

**1.3 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.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in the following format:
  - 1. Working electronic copy of schedule file, where indicated.
  - 2. Two paper copies.
- B. 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.
- C. Construction Schedule Updating Reports: Submit with Applications for Payment.
- D. Daily Construction Reports: Submit at monthly intervals.
- E. Material Location Reports: Submit at monthly intervals.
- F. Site Condition Reports: Submit at time of discovery of differing conditions.
- G. Special Reports: Submit at time of unusual event.

#### 1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  1. Review software limitations and content and format for reports.
  2. Verify availability of qualified personnel needed to develop and update schedule.
  3. Discuss constraints, including work stages area separations and partial Owner occupancy.
  4. Review delivery dates for Owner-furnished products.
  5. Review schedule for work of Owner's separate contracts.
  6. Review submittal requirements and procedures.
  7. Review time required for review of submittals and resubmittals.
  8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  9. Review time required for Project closeout and Owner startup procedures.
  10. Review and finalize list of construction activities to be included in schedule.
  11. Review procedures for updating schedule.

#### 1.6 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 20days, unless specifically allowed by Architect.
  2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
    - a. .
  3. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's 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. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 011000 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

6. 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. Use of premises restrictions.
- 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. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice to Proceed. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.
- 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 (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

## 2.4 SPECIAL REPORTS

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

## PART 3 - EXECUTION

### 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 Architect Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION **013200**



**SECTION 013300 - SUBMITTAL PROCEDURES****PART 1 - GENERAL****1.1 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.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for submittals required for performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Submittal schedule.
  - 3. Daily construction reports.
  - 4. Shop Drawings.
  - 5. Product Data.
  - 6. Samples.
  - 7. Quality assurance submittals.
- B. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to, the following:
  - 1. Permits.
  - 2. Applications for Payment.
  - 3. Performance and payment bonds.
  - 4. Insurance certificates.
  - 5. List of subcontractors.
- C. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Payment Procedures" specifies requirements for submittal of the Schedule of Values.
  - 2. Division 1 Sections "Closeout Procedures", "Operation and Maintenance Data", and "Project Record Documents" specifies requirements for submittal of Project Record Documents and warranties at project closeout.

**1.3 DEFINITIONS**

- A. Coordination Drawings show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or to function as intended.
  - 1. Preparation of Coordination Drawings is specified in Division 1 Section "Coordination" and may include components previously shown in detail on Shop Drawings or Product Data.

- B. Field samples are full-size physical examples erected on-site to illustrate finishes, coatings, or finish materials. Field samples are used to establish the standard by which the Work will be judged.
- C. Mockups are full-size assemblies for review of construction, coordination, testing, or operation; they are not Samples.

#### 1.4 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
  - 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 elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
    - a. The Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
  - 3. Processing: To avoid the need to delay installation as a result of the time required to process submittals, allow sufficient time for submittal review, including time for resubmittals.
    - a. Allow 21 days for initial review. Allow additional time if the Architect must delay processing to permit coordination with subsequent submittals.
    - b. If an intermediate submittal is necessary, process the same as the initial submittal.
    - c. Allow 21 days for reprocessing each submittal.
    - d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.
  - 1. Provide a space approximately 4 by 6 inches on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.
  - 2. Include the following information on the label for processing and recording action taken.
    - a. Project name.
    - b. Date.
    - c. Name and address of the Architect.
    - d. Name and address of the Contractor.
    - e. Name and address of the subcontractor.
    - f. Name and address of the supplier.

- g. Name of the manufacturer.
  - h. Number and title of appropriate Specification Section.
  - i. Drawing number and detail references, as appropriate.
- C. **Submittal Transmittal:** Package each submittal appropriately for transmittal and handling. Transmit each submittal from the Contractor to the Architect using a transmittal form. The Architect will not accept submittals received from sources other than the Contractor.
  - 1. On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.
  - 2. Transmittal Form: Use AIA Document G810 or similar.
- D. **Quantity of Submittals:** The Contractor shall submit multiple copies of each submittal as required including drawings, product data, and color samples as follows:
  - 1. One copy will be retained by the Architect.
  - 2. One copy will be retained by the consulting engineer (as applicable).
  - 3. One copy will be retained by the Contractor for use in close out documents.
  - 4. One copy will be retained by the Contractor for office records.
  - 5. One copy will be retained by the Contractor for use on site.
  - 6. The Contractor shall submit additional copies as needed for distribution to subcontractors, coordination, or other purposes.
  - 7. See Division 15 Mechanical and Division 16 Electrical for number of submittals and additional requirements.

## 1.5 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. **Bar-Chart Schedule:** Prepare a fully developed, horizontal bar-chart-type, contractor's construction schedule. Submit within 30 days after the date established for "Commencement of the Work."
  - 1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values."
  - 2. Within each time bar, indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
  - 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
  - 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically the sequences necessary for completion of related portions of the Work.
  - 5. Coordinate the Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittal Schedule, progress reports, payment requests, and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
- B. Phasing: On the schedule, show how requirements for phased completion to permit Work by separate Contractors and partial occupancy by the Owner affect the sequence of Work.
- C. Work Stages: Indicate important stages of construction for each major portion of the Work, including submittal review, testing, and installation.
- D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
- E. Cost Correlation: At the head of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of the dates used for preparation of payment requests.
  1. Refer to Division 1 Section "Applications for Payment" for cost reporting and payment procedures.
- F. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
  1. When revisions are made, distribute 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 construction activities.
- G. Schedule Updating: Revise the schedule after each meeting, event, or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

## 1.6 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's Construction Schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for submittal of the Contractor's Construction Schedule.
  1. Coordinate Submittal Schedule with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction Schedule.
  2. Prepare the schedule in chronological order. Provide the following information:
    - a. Scheduled date for the first submittal.
    - b. Related Section number.
    - c. Submittal category (Shop Drawings, Product Data, or Samples).
    - d. Name of the subcontractor.
    - e. Description of the part of the Work covered.
    - f. Scheduled date for resubmittal.
    - g. Scheduled date for the Architect's final release or approval.

- B. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the Project meeting room and field office.
  - 1. When revisions are made, distribute 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 construction activities.
- C. Schedule Updating: Revise the schedule after each meeting or activity where revisions have been recognized or made. Issue the updated schedule concurrently with the report of each meeting.

## 1.7 SHOP DRAWINGS

- A. Submit newly prepared information drawn accurately to scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not a Shop Drawing.
- B. Shop Drawings include fabrication and installation Drawings, setting diagrams, schedules, patterns, templates and similar Drawings. Include the following information:
  - 1. Dimensions.
  - 2. Identification of products and materials included by sheet and detail number.
  - 3. Compliance with specified standards.
  - 4. Notation of coordination requirements.
  - 5. Notation of dimensions established by field measurement.
  - 6. 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 36 by 48 inches (890 by 1220 mm).
  - 7. Do not use Shop Drawings without an appropriate final stamp indicating action taken.

## 1.8 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information, such as manufacturer's installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams, and performance curves.
  - 1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products that are not required, mark copies to indicate the applicable information. Include the following information:
    - a. Manufacturer's printed recommendations.
    - b. Compliance with trade association standards.
    - c. Compliance with recognized testing agency standards.
    - d. Application of testing agency labels and seals.
    - e. Notation of dimensions verified by field measurement.

- f. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Distribution: Furnish copies of all submittals to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
  - a. Do not proceed with installation until a copy of Product Data is in the Installer's possession.
  - b. Do not permit use of unmarked copies of Product Data in connection with construction.

## 1.9 SAMPLES

- A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture, and pattern.
  1. Mount or display Samples in the manner to facilitate review of qualities indicated. Prepare Samples to match the Architect's sample. Include the following:
    - a. Specification Section number and reference.
    - b. Generic description of the Sample.
    - c. Sample source.
    - d. Product name or name of the manufacturer.
    - e. Compliance with recognized standards.
    - f. Availability and delivery time.
  2. Submit Samples for review of size, kind, color, pattern, and texture. Submit Samples for a final check of these characteristics with other elements and a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
    - a. Where variation in color, pattern, texture, or other characteristic is inherent in the material or product represented, submit at least 3 multiple units that show approximate limits of the variations.
    - b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
    - c. Refer to other Sections for Samples to be returned to the Contractor for incorporation in the Work. Such Samples must be undamaged at time of use. On the transmittal, indicate special requests regarding disposition of Sample submittals.
    - d. Samples not incorporated into the Work, or otherwise designated as the Owner's property, are the property of the Contractor and shall be removed from the site prior to Substantial Completion.

3. Preliminary Submittals: Submit a full set of choices where Samples are submitted for selection of color, pattern, texture, or similar characteristics from a range of standard choices.
    - a. The Architect will review and return preliminary submittals with the Architect's notation, indicating selection and other action.
  4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation, and similar characteristics, submit 3 sets. The Architect will return one set marked with the action taken.
  5. Maintain sets of Samples, as returned, at the Project Site, for quality comparisons throughout the course of construction.
    - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
    - b. Sample sets may be used to obtain final acceptance of the construction associated with each set.
- B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.
1. Field samples are full-size examples erected on-site to illustrate finishes, coatings, or finish materials and to establish the Project standard.
    - a. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

#### 1.10 QUALITY ASSURANCE SUBMITTALS

- A. Submit quality-control submittals, including design data, certifications, manufacturer's instructions, manufacturer's field reports, and other quality-control submittals as required under other Sections of the Specifications.
- B. Certifications: Where other Sections of the Specifications require certification that a product, material, or installation complies with specified requirements, submit a notarized certification from the manufacturer certifying compliance with specified requirements.
  1. Signature: Certification shall be signed by an officer of the manufacturer or other individual authorized to sign documents on behalf of the company.
- C. Inspection and Test Reports: Requirements for submittal of inspection and test reports from independent testing agencies are specified in Division 1 Section "Quality Control."

#### 1.11 ARCHITECT'S ACTION

- A. Except for submittals for the record or information, where action and return is required, the Architect will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.
- B. Action Stamp: The Architect will stamp each submittal with a uniform, action stamp. The Architect will mark the stamp appropriately to indicate the action taken, as follows:
1. Final Unrestricted Release: When the Architect marks a submittal "**No Exceptions Taken**," the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
  2. Final-But-Restricted Release:
    - a) When the Architect marks a submittal "**Furnish As Corrected**," the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance.
    - b) When the Architect marks a submittal "**Submit Specified Item**," the Work covered by the submittal has omitted a required element, component, or a portion of the submittal. Provide a new submittal for the portion that is noted "**Submit Specified Item**" that complies with requirements of the Contract Documents. The portion that is not noted "**Submit Specified Item**" may proceed provided it complies with requirements of the Contract Documents.
  3. Returned for Resubmittal:
    - a) When the Architect marks a submittal "**Revise and Resubmit**," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark. *Do not use, or allow others to use, submittals marked "Revise and Resubmit" at the Project Site or elsewhere where Work is in progress.* Final payment depends on that compliance.
    - b) When the Architect marks a submittal "**Rejected**," do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. This mark may also indicate that the architect suspects the submittals were not reviewed by the contractor prior to coming to the architect. Prepare a new submittal according to the notations; resubmit without delay with a full review of the general contractor. Repeat if necessary to obtain different action mark. *Do not use, or allow others to use, submittals marked "Rejected" at the Project Site or elsewhere where Work is in progress.* Final payment depends on that compliance.
  4. Other Action: Where a submittal is for information or record purposes or special processing or other activity, the Architect will return the submittal marked "Action Not Required."



C. Unsolicited Submittals: The Architect will return unsolicited submittals to the sender without action.

D. Shop Drawing Stamp: The following is the content of the Shop Drawing Review Stamp-

NO EXCEPTIONS TAKEN

REVISE AND RESUBMIT

REJECTED

SUBMIT SPECIFIED ITEM

**FURNISH AS CORRECTED**

This check is only for review of general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve the Contractor from compliance with requirements of the drawing and specifications. The Contractor is responsible for confirming and correlating all quantities and dimensions and for selecting fabrication processes. The Contractor shall review for general conformance with techniques of construction and coordinate his work with that of all other trades to perform his work in a safe and satisfactory manner.

**JBHM ARCHITECTS, P.A.**

DATE: \_\_\_\_\_ BY: \_\_\_\_\_

**PART 2 - PRODUCTS**

Not Used

**PART 3 - EXECUTION**

Not Used

**END OF SECTION 013300**



## SECTION 013324: STRUCTURAL SUBMITTALS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Structural submittals include shop drawings, diagrams, illustrations, schedules, performance charts, nomenclature charts, samples, brochures and other data prepared by the Contractor or any subcontractor, manufacturer, supplier, fabricator, or distributor and which illustrate some portion of the Project.

## 1.2 RELATED SECTIONS

- A. Division 1 Sections

## 1.3 SUBMITTAL PROCEDURES

- A. Submittals shall be accompanied by a transmittal letter with the following information:
  - 1. Project name.
  - 2. Contractor's name.
  - 3. Date submitted.
  - 4. Description of items submitted; identify Work and product by Specification Section.
  - 5. Number of drawings and other pertinent data.
- B. Provide blank space on each submittal for the Architect/Structural Engineer's review stamp.
- C. The type and number of submittals for each item shall be in accordance with Section 013300.
- D. Contractor shall direct specific attention on the submittal to any deviation from the Construction Documents.

## 1.4 CONTRACTOR RESPONSIBILITY

- A. Contractor shall make all submittals in advance of installation or construction to allow the Architect/Structural Engineer sufficient time for review.
- B. Contractor shall review all submittals and shall stamp and sign each sheet of shop drawings and product data and sign each sample to certify compliance with requirements of Construction Documents. SUBMITTALS RECEIVED WITHOUT THE CONTRACTOR'S STAMP OF REVIEW WILL BE RETURNED TO THE CONTRACTOR FOR REVIEW AND RESUBMITTAL.
- C. Contractor shall understand that the submittal of the required documents does not constitute compliance with the requirements of the Construction Documents; only submittals reviewed by the Architect/Structural Engineer constitute compliance.
- D. It is the Contractor's responsibility to furnish equipment, materials, and labor for the Project which meets the requirements of the codes and authorities quoted as well as the

Construction Documents. Proprietary items specified herein only establish a minimum functional and aesthetic standard and it is incumbent upon the Contractor to ascertain conformance of these proprietary items or any proposed substitution with the codes and authorities.

- E. By reviewing, approving and submitting shop drawings, product data, or samples, Contractor thereby represents that he has determined and verified all field measurements, field construction criteria, materials, member sizes catalog numbers, and similar data and that he has checked and coordinated shop drawings with the requirements of the Project and of the Construction Documents.
- F. Work requiring shop drawings, whether called for by the Construction Documents or requested by the Contractor, shall not commence until the Architect/Structural Engineer has reviewed the submission. Work may commence if the Contractor verifies the accuracy of the Architect/Structural Engineer's corrections and notations and complies with them without exception and without requesting change in Contract Sum or Contract Time.

#### 1.5 ARCHITECT / STRUCTURAL ENGINEER REVIEW

- A. Architect/Structural Engineer will review submittals with reasonable promptness.
- B. Architect/Structural Engineer's review or corrections refer only to the general arrangement and conformance of the subject of the submittals with the design concept of the Project and with the information given in the Construction Documents. Under no conditions should the Contractor consider the review to include the dimensions, quantities, and details of the items nor the approval of an assembly in which the item functions.
- C. Architect/Structural Engineer's review shall not relieve the Contractor from responsibility for errors or omissions in the submittals.
- D. Architect/Structural Engineer's review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Construction Documents unless the Contractor has directed specific attention to the deviation at the time of submission and the Architect/Structural Engineer has given written approval to the specific deviation.
- E. Architect/Structural Engineer's review of submittals shall not be construed as authorizing any change in the Contract Sum or Contract Time.

#### 1.6 SHOP DRAWINGS

- A. Present in a clear and thorough manner. Title each drawing with Project name and number; identify each element of drawings by reference to sheet number and detail of Construction Documents.
- B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Identify field dimensions; show relationship to adjacent or critical features of Work or products.

- D. A copy of the marked structural shop drawings with the Architect/Structural Engineer's review stamp is to be maintained at the job site.

#### 1.7 PRODUCT DATA

- A. Submit only pages that are pertinent; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- B. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the Work. Delete information that is not applicable.
- C. Provide manufacturer's preparation, assembly, and installation instructions.

#### 1.8 SAMPLES

- A. Submit full range of manufacturer's standard finishes, except where more restrictive requirements are specified, indicating colors, textures, and patterns.
- B. Submit samples to illustrate functional characteristics of products, including parts and attachments as required by Architect/Structural Engineer.
- C. Approved samples that are of proper size may be incorporated in Work.
- D. Label each sample with identification.
- E. Field Finishes: Provide full samples at Project, at location acceptable to Architect/Structural Engineer, as required by individual Specification Section. Install each sample complete and finished. Acceptable finishes in place may be retained in completed Work.

#### 1.9 RESUBMITTALS

- A. When submittals are returned to the Contractor with the Architect/Structural Engineer's corrections the Contractor shall make the required corrections. Upon request, resubmit one corrected set.
- B. Contractor shall direct specific attention on the resubmittal to all revisions including those requested by the Architect/Structural Engineer on previous submission.

#### 1.10 DISTRIBUTION

- A. Distribute reproductions of shop drawings, copies of product data, and samples which bear the Architect/Structural Engineer's review stamp to job site file, Record Documents file, subcontractors, suppliers, other affected contractors, and other entities requiring information.
- B. Work shall be in accordance with and performed from the reviewed drawings.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

## SECTION 014000 - QUALITY REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. 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. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- B. Related Sections:
  - 1. Division 01 Section "Allowances" for testing and inspecting allowances.

#### 1.2 DEFINITIONS

- A. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- B. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of 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 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

#### 1.4 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within days of , and not less than days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager .

C. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Owner-performed tests and inspections indicated in the Contract Documents.

## 1.5 REPORTS AND DOCUMENTS

A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

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

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

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. 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 ; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to



authorities.

- B. 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. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.
  2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- C. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  3. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
    - a. Allow days for initial review and each re-review of each mockup.
- D. Integrated Exterior Mockups: Construct integrated exterior mockup in accordance with approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials.

## 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. 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. Notify testing agencies at least hours in advance of time when Work that requires testing or inspecting will be performed.

- C. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  - 1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
- D. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses. .

## PART 2 - EXECUTION

### 2.1 TEST AND INSPECTION LOG

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

END OF SECTION **014000**

## SECTION 014200 - REFERENCES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 DEFINITIONS

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

#### 1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and

effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

#### 1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  - 2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
  - 3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  - 4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  - 5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  - 6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  - 7. ABMA - American Boiler Manufacturers Association; [www.abma.com](http://www.abma.com).
  - 8. ACI - American Concrete Institute; (Formerly: ACI International); [www.abma.com](http://www.abma.com).
  - 9. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
  - 10. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
  - 11. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
  - 12. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  - 13. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
  - 14. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  - 15. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
  - 16. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
  - 17. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
  - 18. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
  - 19. AITC - American Institute of Timber Construction; [www.aitc-glulam.org](http://www.aitc-glulam.org).
  - 20. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  - 21. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  - 22. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).

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

- [www.csa-international.org](http://www.csa-international.org).
65. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
  66. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
  67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
  68. CWC - Composite Wood Council; (See CPA).
  69. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
  70. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
  71. ECA - Electronic Components Association; (See ECIA).
  72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
  73. ECIA - Electronic Components Industry Association; [www.eciaonline.org](http://www.eciaonline.org).
  74. EIA - Electronic Industries Alliance; (See TIA).
  75. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
  76. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
  77. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
  78. ESTA - Entertainment Services and Technology Association; (See PLASA).
  79. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
  80. FCI - Fluid Controls Institute; [www.fluidcontrolsinstitute.org](http://www.fluidcontrolsinstitute.org).
  81. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
  82. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
  83. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
  84. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
  85. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; [www.floridarroof.com](http://www.floridarroof.com).
  86. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
  87. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
  88. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
  89. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
  90. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
  91. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
  92. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
  93. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
  94. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
  95. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
  96. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
  97. IAS - International Accreditation Service; [www.iasonline.org](http://www.iasonline.org).
  98. IAS - International Approval Services; (See CSA).
  99. ICBO - International Conference of Building Officials; (See ICC).
  100. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  101. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
  102. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
  103. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
  104. IEC - International Electrotechnical Commission; [www.iec.ch](http://www.iec.ch).
  105. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).

106. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
107. IESNA - Illuminating Engineering Society of North America; (See IES).
108. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
109. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
110. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
111. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
112. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
113. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
114. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
115. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
116. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
117. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
118. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
119. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
120. LMA - Laminating Materials Association; (See CPA).
121. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
122. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
123. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
124. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
125. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
126. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
127. MIA - Marble Institute of America; [www.marble-institute.com](http://www.marble-institute.com).
128. MMPA - Moulding & Millwork Producers Association; [www.wmmpa.com](http://www.wmmpa.com).
129. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
130. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
131. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
132. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
133. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
134. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org)[www.naima.org](http://www.naima.org).
135. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
136. NBI - New Buildings Institute; [www.newbuildings.org](http://www.newbuildings.org).
137. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
138. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
139. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
140. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
141. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
142. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
143. NETA - InterNational Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
144. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
145. NFPA - National Fire Protection Association; [www.nfpa.org](http://www.nfpa.org).

146. NFPA - NFPA International; (See NFPA).
147. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
148. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
149. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
150. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
151. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
152. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
153. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
154. NSF - NSF International; [www.nsf.org](http://www.nsf.org).
155. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
156. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
157. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
158. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
159. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
160. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).
161. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
162. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
163. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
164. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
165. SAE - SAE International; [www.sae.org](http://www.sae.org).
166. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
167. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
168. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
169. SEFA - Scientific Equipment and Furniture Association (The); [www.sefalabs.com](http://www.sefalabs.com).
170. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
171. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
172. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
173. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
174. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
175. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
176. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
177. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
178. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
179. SRCC - Solar Rating & Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
180. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
181. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
182. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
183. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
184. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
185. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
186. TCNA - Tile Council of North America, Inc.; [www.tileusa.com](http://www.tileusa.com).
187. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
188. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); [www.tiaonline.org](http://www.tiaonline.org).



189. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
190. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
191. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
192. TPI - Turfgrass Producers International; [www.turfgrassod.org](http://www.turfgrassod.org).
193. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
194. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
195. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
196. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
197. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
198. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
199. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
200. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
201. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
202. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).
203. WI - Woodwork Institute; [www.wicnet.org](http://www.wicnet.org).
204. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
205. WWPA - Western Wood Products Association; [www.wwpa.org](http://www.wwpa.org).

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
2. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
3. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
4. DOD - Department of Defense; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
8. FG - Federal Government Publications; [www.gpo.gov](http://www.gpo.gov).
9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; [www.eetd.lbl.gov](http://www.eetd.lbl.gov).
12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
13. SD - Department of State; [www.state.gov](http://www.state.gov).
14. TRB - Transportation Research Board; National Cooperative Highway Research

- Program; The National Academies; [www.trb.org](http://www.trb.org).
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
  16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
  17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
  18. USP - U.S. Pharmacopeial Convention; [www.usp.org](http://www.usp.org).
  19. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; [www.quicksearch.dla.mil](http://www.quicksearch.dla.mil).
  - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
  - b. Available from General Services Administration; [www.gsa.gov](http://www.gsa.gov).
  - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION **014200**

## SECTION 014524: STRUCTURAL SPECIAL INSPECTIONS

## PART 1 GENERAL

## 1.1 SECTION INCLUDES

- A. Section summarizes the responsibility of the Contractor and the Special Inspector in the performance of the special inspections required in the Construction Documents.
- B. Neither the observation of the Architect/Structural Engineer in the administration of the contract, nor tests/inspections by the Special Inspector, nor approvals by persons other than the Architect/Structural Engineer shall relieve the Contractor from his obligation to perform the Work in accordance with the Construction Documents.

## 1.2 RELATED SECTIONS

- A. Section 013324 - Structural Submittals.

## 1.3 REFERENCES

- A. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.
- B. American Council of Independent Laboratories – Recommended Requirements for Independent Laboratories Qualifications.

## 1.4 SELECTION AND PAYMENT

- A. Contractor will employ and pay for the structural testing/inspection services that are required by the Construction Documents.
- B. Contractor shall pay for any additional structural testing/inspection required for Work or materials not complying with Construction Documents due to negligence or nonconformance.
- C. Contractor shall pay for any additional structural testing/inspection required for his convenience.

## 1.5 STRUCTURAL TESTING/INSPECTION REQUIREMENT SUMMARY

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings for the required tests/inspections.

## 1.6 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit name of Special Inspector, address, telephone number, fax number, and names and qualifications of technicians, inspectors, and engineers who will be working on this Project.
- B. If multiple Special Inspectors are used, submit the information stated above for each firm along with a statement of the testing/inspection responsibilities for each firm.

## 1.7 STRUCTURAL TESTING/INSPECTION AGENCY'S QUALIFICATIONS

- A. Provide inspectors qualified to perform special inspections as required by the Building Code and the Construction Documents.
  - 1. Inspectors shall have a minimum of two years' experience.
  - 2. Where required, the Inspectors shall be approved by the local building authority.
- B. Comply with the American Council of Independent Laboratories recommended requirements.
- C. Comply with ASTM E329.
- D. Maintain properly calibrated equipment; calibrated within the past 12 months with devices of accuracy traceable to either National Bureau of Standards (NBS) or accepted values of natural physical constants.
- E. Inspection of all field welding operations, including the installation of automatic end-welded stud shear connectors, shall be made by qualified welding inspectors. Such inspectors shall be persons trained and thoroughly experienced in inspecting welding operations. The minimum requirements for a qualified welding inspector shall be as those for an AWS certified welding inspector (CWI), as defined in the provisions of the 1992 edition of AWS QCI, Standard and Guide for Qualification and Certification of Welding Inspectors published by the American Welding Society. Inspectors performing nondestructive testing shall be qualified in accordance with the American Society of Nondestructive Testing, Inc.

## PART 2 MATERIALS

Not Used.

## PART 3 EXECUTION

### 3.1 STRUCTURAL PRECONSTRUCTION MEETING

- A. A structural preconstruction meeting may be conducted at the construction site by the Structural Engineer to discuss quality issues. The parties involved may be the Architect, Contractor, Special Inspector, appropriate subcontractors, suppliers, and detailers.

### 3.2 SPECIAL INSPECTOR'S RESPONSIBILITIES

- A. Cooperate with the Contractor and provide timely service.
- B. Upon arriving at the construction site, sign in and notify the Contractor of presence.
- C. Select the representative samples that are to be tested/inspected.
- D. Perform tests/inspections as outlined in Construction Documents, the applicable codes, and as directed by the Structural Engineer.

- E. Report results of tests/inspections in accordance with the Construction Documents and the Building Code. Work and materials not complying with Construction Documents shall be immediately reported to the Contractor and Structural Engineer.
- F. Leave copies of field notes with the Contractor prior to leaving the construction site. Field notes shall include the message given to the Contractor, date, time of message, name of Contractor's representative informed, type and location of Work or materials tested/inspected, whether the work or materials complies with Construction Documents and name of the Structural Testing/Inspection Agency's representative.
- G. Report and distribute results of tests/inspections promptly in the form of written reports as directed by the Structural Engineer.
- H. Special Inspector shall not alter requirements of Construction Documents, approve or reject any portion of the Work, or perform duties of the Contractor.
- I. Submit written confirmation at end of construction that, to the best of their knowledge, the structural Work conforms to the Construction Documents.

### 3.3 CONTRACTOR'S RESPONSIBILITIES

- A. Provide copy of Construction Documents to the Special Inspector.
- B. Arrange the preconstruction meeting to discuss quality issues.
- C. Notify the Special Inspector sufficiently in advance of operations to allow assignment of personnel and scheduling of tests.
- D. Cooperate with Special Inspector and provide access to Work.
- E. Provide samples of materials to be tested in required quantities.
- F. Furnish copies of mill test reports when requested.
- G. Provide storage space for Special Inspector's exclusive use, such as for storing and curing concrete testing samples.
- H. Provide labor to assist the Special Inspector in performing tests/inspections.

### 3.4 OPTIONS

- A. If the Structural Testing/Inspection Agency is located at such a distance from the Project that travel expenses will be a consideration, or if the amount of sampling performed is minor, and by mutual agreement of the Architect/Structural Engineer and Contractor, the Contractor may be requested to take samples and forward them to the Structural Testing/Inspection Agency for testing/inspection.

END OF SECTION



**SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 USE CHARGES**

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

**1.4 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.

## 1.5 QUALITY ASSURANCE

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

## 1.6 PROJECT CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide **galvanized steel** bases for supporting posts.
- C. Wood Enclosure Fence: Plywood, 6 feet high, framed with four 2-by-4-inch rails, with preservative-treated wood posts spaced not more than 8 feet apart.

### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, Construction Manager, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:



1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
  2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
1. Store combustible materials apart from building.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: 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 testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
- C. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
1. Locate facilities to limit site disturbance as specified in Division 01 Section "Summary."
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed

permanent facilities.

### 3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- D. 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.
- E. 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.
  - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service overhead, unless otherwise indicated.
  - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install 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.
    - b. Provide one telephone line(s) for Owner's use.
  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. Architect's office.
    - e. Engineers' offices.
    - 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.
- I. Electronic Communication Service: Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. Equip computer with not less than the following:
1. Processor: Intel Pentium D or Intel CoreDuo, GHz processing speed.
  2. Memory: gigabyte.
  3. Disk storage: gigabyte hard disk drive and combination DVD-RW/CD-RW drive.
  4. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum upload and download speeds at each computer.
  5. Backup: External hard drive, minimum gigabyte, with automated backup software providing daily backups.
- 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 of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
  2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

- 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 on Drawings.
- 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.
- 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 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 nor 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: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
- I. 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.

J. Temporary Elevator Use: **Use of elevators is not permitted.**

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. 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.

1. Comply with work restrictions specified in Division 01 Section "Summary."

B. Temporary Erosion and Sedimentation Control: Comply with **requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.**

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located 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. Obtain extended warranty for Owner. 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. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction **and requirements indicated on Drawings**.
- J. 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.
- K. 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.
- L. 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.
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 as follows:

1. Protect porous materials from water damage.
  2. Protect stored and installed material from flowing or standing water.
  3. Keep porous and organic materials from coming into prolonged contact with concrete.
  4. Remove standing water from decks.
  5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction 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. Periodically collect and remove waste containing cellulose or other organic matter.
  4. Discard or replace water-damaged material.
  5. Do not install material that is wet.
  6. Discard, replace or clean stored or installed material that begins to grow mold.
  7. 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. Use permanent HVAC system to control humidity.
  3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
    - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.
- 3.6 OPERATION, TERMINATION, AND REMOVAL
- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
  - B. Maintenance: Maintain facilities in good operating condition until removal.

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

END OF SECTION **015000**



**SECTION 016000 - PRODUCT REQUIREMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Sections:
  - 1. Division 01 Section "Allowances" for products selected under an allowance.
  - 2. Division 01 Section "Substitution Procedures" for requests for substitutions.
  - 3. Division 01 Section "References" for applicable industry standards for products specified.

**1.3 DEFINITIONS**

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

#### 1.4 ACTION SUBMITTALS

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

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

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

1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.

B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution.

1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. 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," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
    - 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, unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## 2.2 COMPARABLE PRODUCTS

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

PART 3 - EXECUTION (Not Used)

END OF SECTION **016000**



**SECTION 017300 - EXECUTION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

- B. Related Sections:

1. Division 01 Section "Submittal Procedures" for submitting surveys.
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 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
4. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

**1.3 DEFINITIONS**

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

**1.4 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For land surveyor or professional engineer.
- B. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate how long services and systems will be disrupted.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit two copies signed by land surveyor.
- F. Final Property Survey: Submit 4 copies showing the Work performed and record survey data.

## 1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
  - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.



- c. Air or smoke barriers.
  - d. Fire-suppression systems.
  - e. Mechanical systems piping and ducts.
  - f. Control systems.
  - g. Communication systems.
  - h. Conveying systems.
  - i. Electrical wiring systems.
  - j. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
  - b. Membranes and flashings.
  - c. Exterior curtain-wall construction.
  - d. Equipment supports.
  - e. Piping, ductwork, vessels, and equipment.
  - f. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## 1.6 WARRANTY

- A. 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.

## 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, utilize products for patching that comply with requirements of Division 01 Section "Sustainable Design Requirements."
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the

fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction.

Coordinate with authorities having jurisdiction.

- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect 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 Architect promptly.
- B. General: Engage a land surveyor or 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 dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  - 3. Inform installers of lines and levels to which they must comply.
  - 4. Check the location, level and plumb, of every major element as the Work progresses.
  - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
  - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  - 3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
  - 1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
  - 2. 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

- 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
  - C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
  - D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
  - E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
  - F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
  - G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
    - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
    - 2. Allow for building movement, including thermal expansion and contraction.
    - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
  - H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
  - I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 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. Temporary Support: Provide temporary support of work to be cut.
- C. 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.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. 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.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.

- b. Restore damaged pipe covering to its original condition.
- 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
  - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### 3.7 OWNER-INSTALLED PRODUCTS

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

### 3.8 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to

regulations.

- a. Utilize containers intended for holding waste materials of type to be stored.
4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- 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. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- F. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- G. 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.
- H. 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.
- I. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.9 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper



operation without binding.

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

### 3.10 PROTECTION OF INSTALLED CONSTRUCTION

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

### 3.11 CORRECTION OF THE WORK

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

**END OF SECTION 017300**



**SECTION 017700 - CLOSEOUT PROCEDURES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

- 1. Substantial Completion procedures.
- 2. Final completion procedures.
- 3. Warranties.
- 4. Final cleaning.

- B. Related Requirements:

- 1. Section 017300 "Execution" for progress cleaning of Project site.
- 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.
- 5. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those sections.

- C. Contractor responsibilities:

- 1. General Contractor, sub-contractor, vendors, and suppliers are to provide complete close out documents in accordance with this section and the Contract Documents.
- 2. Contractor shall establish close out document conference to be held at Substantial Completion.
- 3. With the closeout submittal, the Contractor shall document, initial, and verify completion of the Contract Closeout Checklist provided by JBHM.
- 4. The Architect will review the closeout submission and notify the Contractor of any failures. The Architect will provide review of second closeout submittal. Any time spent by the Architect after the second review will be billed as additional services under Article 9.8.2.1 of Supplementary Conditions.

### 1.3 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 (AS BUILTS), operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."

6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
11. Establish and notify all parties of closeout conference date and time. Preferably immediately following the substantial completion inspection unless otherwise approved by Architect/Owner.

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 substantial completion inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

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

#### 1.4 FINAL COMPLETION PROCEDURES

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

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

## 1.5 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. Use CSI Form 14.1A or similar form.
1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. PDF electronic file. Architect will return annotated file.

## 1.6 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.

- f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
  - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
  - h. Sweep concrete floors broom clean in unoccupied spaces.
  - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
  - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
  - k. Remove labels that are not permanent.
  - l. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
  - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - n. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
  - o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
  - p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
  - q. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
    - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.
  - r. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - s. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Specification Section 015000 Temporary Facilities and Controls. Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

END OF SECTION **017700**



## **Request for Substantial Completion Inspection**

Project Number \_\_\_\_\_ Date \_\_\_\_\_

Project Name \_\_\_\_\_ Contractor \_\_\_\_\_

<b>As the Contractor's representative for the referenced project I certify that I have completed the following items:</b>	<b>Date Completed</b>	<b>Initials</b>
1. Prepare a list of items to be completed and corrected (Contractor's punch list), the value of items on the list, and reasons why the Work is not complete.		
2. Advise Owner of pending insurance changeover requirements.		
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.		
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.		
5. Prepare and submit Project Record Documents (AS BUILTS), operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.		
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.		
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.		
8. Complete startup testing of systems.		
9. Submit test/adjust/balance records.		
10. Terminate and remove temporary facilities from Project Site, along with mockups, construction tools, and similar elements.		
11. Advise Owner of changeover in heat and other utilities.		
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.		
13. Complete final cleaning requirements, including touchup painting.		
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.		
15. Establish and notify all parties of closeout conference date and time (preferably immediately following the S.C. Inspection)		

As the Contractor's representative for the referenced project I certify that I **understand** the following:

1. Final completion must be reached within 30 days of substantial completion or the Owner has the option to have remaining Work completed and to deduct reasonable costs from the amount due. (Section 002213)
2. The Owner may deduct from the final pay application for payment to the Architect for additional services required due to the Contractor's failure to achieve final completion within 30 days.

**CERTIFIED BY:** \_\_\_\_\_

## **Request for Final Completion Inspection**

Project Number \_\_\_\_\_ Date \_\_\_\_\_

Project Name \_\_\_\_\_ Contractor \_\_\_\_\_

<b>As the Contractor's representative for the referenced project I certify that I have completed the following items:</b>	<b>Date Completed</b>	<b>Initials</b>
1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures".		
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.		
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.		
4. Submit pest-control final inspection report and warranty.		
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.		

As the Contractor's representative for the referenced project I certify that I **understand** the following:

1. Final completion is established as the date indicated on the Certificate of Final Completion.
2. As per Section 002213 all warranties commence at substantial completion.
3. Final pay application, Consent of Surety to Final Payment, the Release of Liens and certification of Payments of Debts and Claims cannot be submitted until all items listed above are complete.

**CERTIFIED BY:** \_\_\_\_\_

**SECTION 017823 - OPERATION AND MAINTENANCE DATA****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 DEFINITIONS**

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

**1.4 CLOSEOUT SUBMITTALS**

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

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.
  2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
  2. List of systems.
  3. List of equipment.
  4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

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

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

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, 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.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
  2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of

products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
  1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION **017823**



**SECTION 017839 - PROJECT RECORD DOCUMENTS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Section 017300 "Execution" for final property survey.
  - 2. Section 017700 "Closeout Procedures" for general closeout procedures.
  - 3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

**1.3 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit two set(s) of marked-up record prints and PDF electronic files of scanned record prints. Submit record Drawings as follows:
    - a. Initial Submittal:
      - 1) Submit two paper-copy set(s) of marked-up record prints and PDF electronic files of scanned record prints. Print each drawing, whether or not changes and additional information were recorded.
      - 2) Architect will review and indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

- b. Final Submittal:
  - 1) Submit two paper-copy set(s) of marked-up record prints and PDF electronic files of scanned record prints. Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit two paper copies and PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit two paper copies and PDF electronic files of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit two paper copies and PDF electronic files of each submittal.
- E. Reports: Submit written report monthly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- 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. Identification: As follows:

- a. Project name.
- b. Date.
- c. Designation "PROJECT RECORD DRAWINGS."
- d. Name of Architect.
- e. Name of Contractor.

## 2.2 RECORD SPECIFICATIONS

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

## 2.3 RECORD PRODUCT DATA

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

## 2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of

the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit record Product Data as paper copy and scanned PDF electronic file(s) of marked-up paper copy of Product Data.
  - 1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

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

END OF SECTION **017839**



**SECTION 017900 - DEMONSTRATION AND TRAINING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 INFORMATIONAL SUBMITTALS**

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

**1.4 QUALITY ASSURANCE**

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.
- D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

## 1.5 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

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



2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project record documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
7. Maintenance: Include the following:

- a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
8. Repairs: Include the following:
- a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

- E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of an oral, a written, or a demonstration performance-based test.
- F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
- D. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- E. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- F. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION **017900**



**SECTION 024119 - SELECTIVE DEMOLITION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Section 011000 "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
  - 4. Section 017300 "Execution" for cutting and patching procedures.

**1.3 DEFINITIONS**

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

**1.4 MATERIALS OWNERSHIP**

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

## 1.5 PREINSTALLATION MEETINGS

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

## 1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

## 1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.  
Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

## 1.8 QUALITY ASSURANCE

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

## 1.9 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.
  - 1. Before selective demolition, the Owner may remove some items.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
  - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- 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.

## 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.

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. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. 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.
  - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
  - 2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, and preconstruction videotapes and templates.
  - 1. Comply with requirements specified in Section 013233 "Photographic Documentation."
  - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
  - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

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. 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.
  2. 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.
- B. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal."
- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
- C. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.
  3. Store items in a secure area until delivery to Owner.
  4. Transport items to Owner's storage area designated by Owner.
  5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
6. Clean and repair items to functional condition adequate for intended reuse.

7. Pack or crate items after cleaning and repairing. Identify contents of containers.
  8. Protect items from damage during transport and storage.
  9. 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.
- C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.5 DISPOSAL OF DEMOLISHED MATERIALS

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

### 3.6 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



## SECTION 031000: CONCRETE FORMING AND ACCESSORIES

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 01 Sections
- B. Section 032000 - Concrete Reinforcing.
- C. Section 033000 - Cast-in-Place Concrete.

## 1.2 REFERENCES

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Standard Specifications for Structural Concrete.

ACI 318 – Building Code Requirements for Structural Concrete.

ACI 347 – Guide to Formwork for Concrete.

ASTM D1751 – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

ASTM E1745 – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

ASTM E1993 – Standard Specification for Bituminous Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

ASTM F1249 – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.

## 1.3 DEFINITIONS

- A. Architectural Concrete: All concrete members exposed to public view are classified as Architectural Concrete and shall comply with the Architectural Concrete provisions in this specification and ACI 301.

#### 1.4 SUBMITTALS

- A. Submit manufacturer's data for:
  - 1. Vapor Retarder
  - 2. Expansion/Isolation Joint Filler.
  - 3. Waterstops.

#### 1.5 DESIGN OF FORMWORK

- A. Design of formwork, shoring, and reshoring and its removal is the Contractor's responsibility.
- B. Design of formwork, shoring, and reshoring shall conform to ACI 117, ACI 301, ACI 318, and ACI 347.
- C. Design formwork in a manner such that existing or new construction is not overloaded.

### PART 2 PRODUCTS

#### 2.1 FORM MATERIALS

- A. Form Material: Wood, plywood, metal, fiberglass or a combination of these, with sufficient strength to prevent distortion.
- B. Form Definitions
  - 1. Standard Forms: No form-facing material required. Standard forms are acceptable everywhere except for Architectural Concrete elements.
  - 2. Architectural Concrete Forms: Form-facing material shall be plywood, tempered concrete-form-grade hardboard, metal (unrusted) or plastic that will produce a smooth, uniform texture on the concrete. Do not use form-facing material with raised grain, torn edges, worn edges, patches, dents, or other defects that will impair the texture of the exposed concrete surfaces. Intent is that when the forms are removed, the exposed concrete surfaces will be free from all blemishes. Architectural concrete forms are required for all concrete elements indicated as Architectural Concrete.

#### 2.2 FORMWORK ACCESSORIES

- A. Formwork Accessories: Commercially manufactured products, including ties and hangers. Do not use nonfabricated wire form ties.

#### 2.3 FORM RELEASE AGENT

- A. Form release agent shall not bond with, stain, nor adversely affect concrete surfaces.

#### 2.4 VAPOR RETARDER

- A. Vapor Retarder
  - 1. Polyethylene sheet, not less than 10 mils thick, complying with ASTM E1745, Class A, B, and C.
  - 2. Maximum Permeance: ASTM E96: 0.04 perms (US).

3. Seam Tape: High Density Polyethylene Tape with pressure sensitive adhesive; minimum width of 4 inches.
4. Pipe Boots: Construct pipe boots from vapor barrier material and seam tape in accordance with manufacturer's instructions.

- B. Vapor Retarder for areas to receive Wood floors: Waterproof and vaporproof membrane complying with ASTM E1993 such as W.R. Meadows Premoulded Membrane Vapor Seal with Plasmatic Core.

## 2.5 EXPANSION / ISOLATION JOINT FILLER

- A. Expansion / Isolation Joint Filler: ASTM D1751, asphalt impregnated premolded fiberboard, 3/8-inch thick by full thickness of slab or joint, unless indicated otherwise in the Structural Drawings.

## 2.6 CONSTRUCTION JOINTS

- A. Slabs On Ground: Steel plate dowel (1/4" thick) such as manufactured by PNA Construction Technologies, Inc., Greenstreak Group, Inc., or approved equal.

1. Plate Thickness: 1/4-inch thick for slabs up to 6 inches in thickness; 3/8-inch for slabs over 6 inches and up to 8 inches in thickness; 3/4-inch thick for slabs over 8 inches in thickness and up to 12 inches in thickness.

## 2.7 WATERSTOPS

- A. Waterstops at construction joints and contraction joints indicated in the Structural Drawings shall be sized to suit the joints.
- B. Waterstops: Preformed, non-expansive, plastic adhesive waterstops such as Synko-Flex, manufactured by Henry Company, or approved equal.

# PART 3 EXECUTION

## 3.1 GENERAL

- A. Erect formwork in accordance with ACI 301 and ACI 347.
- B. Finished work shall comply with tolerances of ACI 117.
- C. Provide 3/4-inch chamfer at all formed corners.

## 3.2 FOUNDATION ELEMENTS

- A. Form foundation elements if soil or other conditions are such that earth trench forms are unsuitable.
- B. Sides of perimeter grade beams, foundation walls, and turned-down slabs shall be formed.
- C. Maintain minimum coverage of reinforcing steel as indicated in Structural Drawings.

### 3.3 VAPOR RETARDER

- A. Where indicated on Structural Drawings, place vapor retarder over granular subbase and behind expansion / isolation joints at walls. Place electrical conduits and ducts in granular subbase.
- B. Install vapor retarder in accordance with manufacturer's instructions and ASTM E1643.
  - 1. Lap vapor retarder six inches minimum at splices and seal with seam tape.
  - 2. Lap vapor retarder over footings and seal to walls.
  - 3. Seal all pipe penetrations with pipe boot.
  - 4. No penetration of vapor retarder is permitted except for reinforcing steel and permanent utilities.
  - 5. Do not puncture vapor retarder; repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides.
- C. Install waterproof and vaporproof membrane in accordance with manufacturer's recommendations.

### 3.4 FORM PREPARATION

- A. Seal form joints to prevent leakage.
- B. Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt or other debris just before concrete is placed.
- C. Before reinforcement is placed, coat contact surfaces of form with form release agent in accordance with manufacturer's recommendations. Do not allow excess form release agent to accumulate in forms or come in contact with concrete surfaces against which fresh concrete will be placed.

### 3.5 INSERTS AND EMBEDMENT ITEMS

- A. Install and secure in position required inserts, embeds, hangers, sleeves, anchors, and nailers.
- B. Locate anchor bolts/rods in position in accordance with approved setting drawings and secure to prevent displacement during concrete placement.

### 3.6 PROVISIONS FOR OTHER TRADES

- A. Install openings in concrete formwork to accommodate work of other trades. Determine size and location of openings and recesses from trades requiring such items. Obtain approval from Structural Engineer for openings not shown in Structural Drawings.
- B. Accurately place and securely support items built into forms.

### 3.7 CONSTRUCTION JOINTS

- A. Slabs On Ground: Install steel plate dowels in accordance with manufacturer's recommendations. Place plate dowels at mid-depth of slab (+/-1/4-inch), unless noted otherwise in the Structural Drawings.
- B. Framed Construction:



1. Install construction joints in accordance with ACI 318.
2. Obtain Architect/Structural Engineer's prior approval for use and location of joints.
3. Provide 1½-inch deep key-type construction joints at end of each placement for framed slabs, beams, walls, and footings. Bevel forms for easy removal.
4. Remove loose particles and latency from surface prior to placing the next lift. Chip the surface to a depth sufficient to expose sound concrete.

### 3.8 WATERSTOPS

- A. Prepare surface and install strip applied waterstops in accordance with manufacturer's recommendations.

### 3.9 FORMWORK REMOVAL

- A. Remove formwork carefully in such manner and at such time as to ensure complete safety of structure. Do not remove formwork, shoring, or reshoring until members have acquired sufficient strength to support their weight and the load thereon safely.
- B. For conventionally reinforced framed slabs, formwork shall remain in place for a minimum of 5 days after concrete placement.
- C. For Architectural Concrete elements, remove forms as early as permissible and in such a manner as to not damage exposed surfaces.

### 3.10 FINISHES OF FORMED SURFACES

- A. Standard Form Finish: Patch tie holes and defects. Chip or rub off fins exceeding ¼ inch in height. Leave surface with the texture imparted by the forms.
- B. Architectural Concrete Finish: Patch tie holes and defects. Remove all fins completely. Produce finish on newly hardened concrete no later than the day following formwork removal. Wet the surface and rub it with carborundum or other abrasive until uniform color and texture are produced. Use no cement grout other than cement paste drawn from the concrete itself by the rubbing process.

END OF SECTION



## SECTION 032000: CONCRETE REINFORCING

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 031000 – Concrete Forming and Accessories.
- C. Section 033000 – Cast-in-Place Concrete.

## 1.2 REFERENCES

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Standard Specifications for Structural Concrete.

ACI 315 – Details and Detailing of Concrete Reinforcement.

ACI 318 – Building Code Requirements for Structural Concrete.

ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete Reinforcement.

ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.

AWS D1.4 – Structural Weld Code - Reinforcing Steel.

AWS D12.1 – Recommended Practices for Welding Reinforcing Steel Metal Inserts, and Connections in Reinforced Concrete Construction.

CRSI – Manual of Standard Practice.

## 1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Shop Drawings:
  - 1. Notify Structural Engineer prior to detailing reinforcing steel shop drawings.
  - 2. Indicate size, spacing, location and quantities of reinforcing steel and wire fabric, bending and cutting schedules, splice lengths, stirrup spacing, supporting and spacing devices. Detail reinforcing steel in accordance with ACI 315 and CRSI Standards.

3. Written description of reinforcement without adequate sections, elevations, and details is not acceptable.
4. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.

C. Submit manufacturer's data for tension and compression splicers.

#### 1.4 QUALITY ASSURANCE

A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

#### 1.5 STORAGE AND PROTECTING

A. Store reinforcing steel above ground so that it remains clean. Maintain steel surfaces free from materials and coatings that might impair bond.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

A. Deformed Reinforcing Steel: ASTM A615, refer to Structural Drawings for grade (Grade 60 minimum).

B. Welded Steel Wire Reinforcement: ASTM A1064.

#### 2.2 ACCESSORY MATERIALS

A. Annealed Steel Tie Wire: 16½ gage minimum.

B. Bar Supports: Plastic-tipped steel Class I bar supports conforming to CRSI Specifications. Concrete brick may be used to support reinforcement to obtain proper clearance from earth.

#### 2.3 SPLICERS

A. Tension Splicers: Capable of developing 125% of the reinforcing steel ASTM specified minimum yield strength.

B. Compression Splicers: Mechanical type such that the compression stress is transmitted by end bearing held in concentric contact.

#### 2.4 DOWEL ADHESIVE

A. Adhesive conforming to Simpson AT-XP (IAPMO-UES ER-263), Simpson SET-XP (ICC-ES ESR-2508), DeWalt/Powers Pure110+ (ICC-ES ESR-3298), DeWalt/Powers DeWalt AC200+ Adhesive (ICC-ES ESR-4027), Hilti HIT-HY 200 Safe Set Fast Cure Adhesive (ICC-ES ESR-3187), Hilti HIT-RE 500 V3 SAFE Set Adhesive (ICC-ES ESR-3814). Minimum Embedment = 12 times anchor diameter, UNO.

## PART 3 EXECUTION

### 3.1 FABRICATION

- A. Fabricate reinforcing steel in accordance with ACI 318 and CRSI standards.
- B. Bend bars cold. Do not heat or flame cut bars. No field bending of bars partially embedded in concrete is permitted, unless specifically approved Structural Engineer and checked by Testing and Inspection Agency for cracks.
- C. Weld only as indicated. Perform welding in accordance with AWS D1.4 and AWS D12.1.
- D. Tag reinforcing steel for easy identification.

### 3.2 INSTALLATION

- A. Before placing concrete, clean reinforcement of foreign particles and coatings.
- B. Place, support, and secure reinforcement against displacement in accordance with ACI 318 and CRSI standards. Do not deviate from alignment or measurement.
- C. Place concrete beam reinforcement support parallel to main reinforcement.
- D. Locate welded wire reinforcement in the top third of slabs. Overlap mesh one lap plus two inches at side and end joints.
- E. Furnish and install dowels or mechanical splices at intersections of walls, columns and piers to permit continuous reinforcement or development lengths at such intersections.
- F. Maintain cover and tolerances in accordance with ACI and CRSI Specifications, unless indicated otherwise on Structural Drawings.

### 3.3 SPLICES

- A. Do not splice reinforcement except as indicated on Structural Drawings.
- B. Tension couplers may be used and installed in accordance with manufacturer's recommendations.

### 3.4 DOWELS IN EXISTING CONCRETE

- A. Install dowels and dowel adhesive in accordance with manufacturer's recommendations.
- B. Minimum embedment length into the existing concrete shall be 12 bar diameters, unless noted otherwise.

END OF SECTION



## SECTION 033000: CAST-IN-PLACE CONCRETE

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 031000 – Concrete Forming and Accessories.
- C. Section 032000 – Concrete Reinforcing.
- D. Section 036200 – Non-shrink Grouting.

## 1.2 REFERENCES

- A. The publications listed below form a part of this specification. The publications are referenced to within the text by the basic designation only.

ACI 117 – Standard Specifications for Tolerances for Concrete Construction and Materials.

ACI 301 – Specifications for Structural Concrete.

ACI 305.1 – Specification for Hot Weather Concreting.

ACI 306.1 – Standard Specification for Cold Weather Concreting.

ACI 308.1 – Specification for Curing Concrete.

ACI 311.6 – Specification for Testing Ready Mixed Concrete

ACI 311.7 – Specification for Inspection of Concrete Construction

ACI 318 – Building Code Requirements for Structural Concrete.

ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.

ASTM C33 – Standard Specification for Concrete Aggregates.

ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

ASTM C94 – Standard Specification for Ready-Mixed Concrete.

ASTM C138 – Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete.

ASTM C150 – Standard Specification for Portland Cement.

ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.

ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

ASTM C260 – Standard Specification for Air-Entraining Admixtures for Concrete.

ASTM C309 – Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

ASTM C469 – Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression.

ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.

ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

ASTM C920 – Standard Specification for Elastomeric Joint Sealants

ASTM D994 – Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)

ASTM E1155 – Standard Test Method for Determining  $F_F$  Floor Flatness and  $F_L$  Floor Levelness Numbers.

### 1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Submit three copies of the concrete mix designs. Include the following:
  - 1. Documentation of mix design proportions complying with ACI 301.
  - 2. Type and quantities of materials including admixtures
  - 3. Slump
  - 4. Air content
  - 5. Water/cement ratio
  - 6. Fresh unit weight
  - 7. Aggregates sieve analysis
  - 8. Design compressive strength
  - 9. Location of placement in structure
  - 10. Method of placement
  - 11. Method of concrete curing
  - 12. Method of protection of concrete
  - 12. Seven-day and 28-day compressive strengths
- C. Mix design submittals not conforming to the above will be rejected.

### 1.4 QUALITY ASSURANCE

- A. The ready-mixed concrete plant shall be certified for conformance with the requirements of the National Ready Mix Concrete Association.



- B. Refer to the Structural Quality Assurance Plan in the Structural Drawings.
- C. The procedures used in sampling shall include the use of every precaution that will assist in obtaining samples that are truly representative of the nature and condition of concrete sampled.
- D. Concrete sampling shall be performed as the concrete is delivered from the mixer to the conveying vehicle used to transport the concrete to the forms.
- E. Sample the concrete by collecting two or more portions taken at regularly spaced intervals during discharge of the middle portion of the batch. The elapsed time shall not exceed 15 min. between obtaining the first and final portions of the composite sample. Take the samples so obtained within the time limit of 15 min. and combine them into one composite sample for test purposes. In any case do not obtain samples until after all of the water and any admixtures have been added to the mixer. Do not obtain samples from the very first or last portions of the batch discharge. Sample by repeatedly passing a receptacle through the entire discharge stream or by completely diverting the discharge into a sample container. Regulate the rate of discharge of the batch by the rate of revolution of the drum and not by the size of the gate opening.
- F. Start tests for slump, temperature, and air content within 5 min after obtaining the final portion of the composite sample and complete these tests expeditiously. Start molding specimens for strength tests within 15 min. after fabricating the composite sample. Expeditiously obtain and use the sample and protect the sample from the sun, wind, and other sources of rapid evaporation, and from contamination.

## PART 2 PRODUCTS

### 2.1 CONCRETE MIX DESIGN

- A. Establish concrete mix design proportions in accordance with Article 4.2.3 of ACI 301.
- B. Concrete Strength: See Structural Notes in Structural Drawings.
- C. Slump
  - 1. Design concrete with a slump between four and ten inches.
  - 2. If a slump greater than five inches is desired, use a water reducer.
- D. Water/Cementitious Materials Ratio (w/cm): See Structural Notes in Structural Drawings.
- E. Entrained Air Content: See Structural Notes in Structural Drawings.
- F. Fresh Unit Weight
  - 1. Normal weight concrete: Fresh unit weight of 137 to 148 pcf.

### 2.2 MATERIALS

- A. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.

- B. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
- C. Obtain aggregate from single source.
- D. Obtain each type of admixture from single source from single manufacturer.
- E. Materials designated by specific manufacturer's trade names are approved, subject to compliance with the quality and performance indicated by the manufacturer. Instructions and recommendations, published by the manufacturer of such materials are included in and are a part of these Specifications.

### 2.3 CEMENT

- A. Cement: Portland cement – ASTM C150.

### 2.4 FLY ASH

- A. Fly Ash: Class C or Class F – ASTM C618. When fly ash is used, the quantity shall be a minimum amount of 15 percent and a maximum amount of 25 percent by weight of the total cementitious materials, unless otherwise specified.

### 2.5 AGGREGATE

- A. Fine Aggregate: Fine aggregate complying with ASTM C33. Natural sand is preferred to manufactured sand.
- B. Fine Aggregate in slabs: The gradation of fine aggregate in concrete mix designs for floor slabs shall meet the requirements in the Table below:

Sieve Designation	Percent Passing	
	Normalweight Aggregate	Lightweight Aggregate
3/8 in.	100	100
No. 4	85 to 100	85 to 100
No. 8	80 to 90	–
No. 16	50 to 75	40 to 80
No. 30	30 to 50	30 to 65
No. 50	10 to 20	10 to 35
No. 100	2 to 5	5 to 20

- C. For normalweight concrete, the weight of fine aggregate in the mix proportion shall not exceed 50 percent of the total weight of fine plus coarse aggregate.
- D. Coarse Aggregate: Washed gravel or crushed stone conforming to ASTM C33. When a single size or combinations of two or more sizes of coarse aggregates are used, the final grading shall conform to the grading requirements of ASTM C33, unless otherwise specified or permitted.

1. Unless governed by the maximum size as specified in Section 2 below, the largest practical-size coarse aggregate shall be used. Except for topping slabs 3-in. thick or less the largest size of coarse aggregate in normalweight concrete shall be a nominal  $\frac{3}{4}$ -in. and the largest size of coarse aggregate in lightweight concrete shall be a nominal  $\frac{1}{2}$ -in. For topping slabs that are 3-in. thick or less the maximum size of coarse aggregate shall be  $\frac{3}{8}$  inch.
2. The nominal maximum size of coarse aggregate shall not exceed three-fourths of the minimum clear spacing between reinforcing bars, one-fifth of the narrowest dimension between sides of forms, or one-third of the thickness of slabs or toppings.

## 2.6 WATER

- A. Water: Potable water

## 2.7 AIR ENTRAINING AGENT

- A. Air Entraining Agent: Air entraining agent shall conform with ASTM C260. For normalweight concrete air entrainment shall not be used in flatwork to receive a hard steel-troweled finish.

## 2.8 WATER REDUCER

- A. Water Reducer: Water reducing agent shall conform with ASTM C494.

## 2.9 ACCELERATORS

- A. Accelerators: Non-chloride accelerators shall conform with ASTM C494.

## 2.10 RETARDERS

- A. Retarders: Retarders shall conform with ASTM C494.

## 2.11 CHLORIDE

- A. Chlorides: Chlorides of any form shall not be used in concrete.

## 2.12 CURING COMPOUND

- A. Curing Compound: A water-based, VOC-compliant concrete curing agent, hardener, and dustproofer that complies with ASTM C309. The curing agent shall be residue-free and contains no wax, resin, or other materials that would inhibit the bond of subsequent coatings and/or treatments. An example of a curing compound that meets this specification is Med-Cure by W.R. Meadows. Coordinate curing compound with flooring supplier to ensure compatibility.

# PART 3 EXECUTION

## 3.1 GENERAL

- A. Prepare place of deposit, mix, convey, and place in accordance with ACI 301 and ACI 304. If concrete is pumped, use a 5-inch minimum hose diameter, except for placement of metal pan stair treads where a 2-inch minimum hose is permitted.

- B. Wet forms before placing concrete.
- C. Deposit concrete continuously and as near as practical to final position.
- D. Deposit concrete in one layer or in multiple layers. Do not place fresh concrete against concrete that would result in cold joints.
- E. Do no flowing of concrete with vibrators.
- F. Do not place concrete over columns or walls until concrete in columns and walls has reached final setting.
- G. For cast-in-place floor systems place concrete for beams, girders, brackets, column capitals, haunches, and drop panels at same time as concrete for adjacent slabs.
- H. Place and finish concrete members to comply with tolerances in ACI 117.
- I. Do not use aluminum equipment in placing and finishing concrete.
- J. Normalweight concrete for slabs to receive a hard-troweled finish shall not contain an air-entraining admixture or have a total air content greater than 3 percent.

### 3.2 SLABS-ON-GROUND

- A. Place concrete for slabs-on-ground on properly prepared granular subbase with vapor barrier.
- B. Place thickened slabs for partitions integral with floor slabs.

### 3.3 ADDITION OF WATER AT JOB SITE

- A. Water may be added at the jobsite if neither the maximum permissible water/cement ratio nor the maximum slump is exceeded. All concrete delivery trucks will have actual batch weight tickets available that clearly indicate the quantity of water that may be added at the jobsite that will not exceed the maximum water/cement ratio.

### 3.4 TIME LIMIT

- A. Deposit concrete within one and one-half hours after batching.

### 3.5 VIBRATION

- A. Consolidate concrete by vibration. Consolidate concrete around reinforcement, embedded items, and into corners of forms. Use immersion-type vibrators with nonmetallic heads for consolidating concrete around epoxy-coated or zinc and epoxy dual-coated reinforcing bars.
- B. Do not use vibrators to move concrete in a manner that will result in segregation.
- C. Spacing of immersion vibrator insertions shall not exceed 1-1/2 times the vibrator's radius of action in concrete being consolidated.

### 3.6 WEATHER PROVISIONS

- A. Do not place concrete while rain, sleet, or snow is falling unless protection is provided. Do not allow precipitation to increase mixing water or to damage concrete surface.
- B. Perform cold weather concreting in accordance with ACI 306. Concrete temperatures at delivery shall meet the requirements of Section 4 in ACI 301. Do not place concrete in contact with surfaces less than 35°F. Unless otherwise specified, this requirement shall not apply to reinforcing steel.
- C. Perform hot weather concreting in accordance with ACI 305. Unless otherwise specified, concrete temperature as placed shall meet the requirements of Section 4 of ACI 301. If temperature of reinforcement, embedments, or forms is greater than 120°F, use a fine mist of water to moisten and cool hot surfaces. Remove standing water before placing concrete.
- D. Protect concrete from drying and excessive temperature for the first seven days. Protect fresh concrete from wind.

### 3.7 CONTRACTION JOINTS

- A. Obtain Architect/Structural Engineer's approval for location of contraction joints. Do not use contraction joints in framed floors or composite slabs, unless noted in Structural Drawings.
- B. Unless noted otherwise in the architectural or structural drawings, provide contraction joints in slabs-on-ground to form a regular grid with a maximum spacing as noted in the Structural Drawings. The long dimension of the grid shall not exceed 1.5 times the short dimension of the grid. Contraction joints may be saw cut if cut within 24 hours after placement of concrete. Saw cuts shall be a depth equal to one-fourth the slab thickness by one-eighth inch wide. Alternately, contraction joints may be provided by preformed plastic strip inserts.
- C. Provide contraction joints in concrete walls at a maximum spacing of 20-ft. centers, or as noted in the Structural Drawings; coordinate location with Architect. Contraction joints shall be formed as a V-groove on both faces of the wall, 3/4-inch minimum depth.

### 3.8 EXPANSION JOINTS IN CONCRETE WALLS

- A. Cantilevered and gravity concrete walls shall have a 1/2-in. expansion joint at a spacing not to exceed 60-ft. on center.
- B. The expansion joint shall contain a waterstop and be filled with premolded joint filler.
- C. The expansion joint in the wall shall not continue through the footing.

### 3.9 CONSTRUCTION JOINTS

- A. Obtain Architect/Structural Engineer's approval for location of construction joints.
- B. Install construction joints in accordance with Section 2 in ACI 301. Remove laitance and thoroughly clean and dampen construction joints before placement of fresh concrete.

- C. Use an approved bonding agent applied in accordance with the manufacturer's requirements or portland-cement grout of the same proportions as the mortar in the concrete; or roughen the surface in an approved manner that exposes coarse aggregate and does not leave laitance, loosened aggregate particles, or damaged concrete at surface.

### 3.10 CONCRETE FINISHES

- A. Finish Concrete in accordance with ACI 301.
- B. After form removal, give each formed surface the specified finish. If the Architectural and Structural drawings do not specify a finish, provide a SF-1.0 finish on concrete surfaces not exposed to view and a SF-2.0 finish on concrete surfaces exposed to view.

- Surface Finish 1.0 (SF1.0)
- 1. No formwork facing material is specified
  - 2. Patch voids larger than 1-1/2 in. wide or 1/2 in. deep
  - 3. Remove projections larger than 1 in.
  - 4. Tie holes need not be patched
  - 5. Surface tolerance Class D as specified in ACI 117
  - 6. Mockup not required

- Surface Finish 2.0 (SF2.0)
- 1. Patch voids larger than 3/4 in. wide or 1/2 in. deep
  - 2. Remove projections larger than 1/4 in.
  - 3. Patch tie holes
  - 5. Surface tolerance Class B as specified in ACI 117
  - 6. Unless otherwise specified, provide mockup of concrete surface appearance and texture

- C. If a Rubbed Finish is specified in the Architectural or Structural drawings, produce the smooth-rubbed finish no later than the day following formwork removal. Wet the surface and rub it with an abrasive such as carborundum brick until uniform color and texture are produced. If insufficient cement paste can be drawn from the concrete itself by the rubbing process, use a grout made with cementitious materials from the same sources as used for in-place concrete.
- D. If a finish is not otherwise specified for the unformed surfaces the following finishes shall apply (Refer to Section 5 of ACI 301 for requirements of each finish):
  - 1. Scratch finish—For surfaces intended to receive bonded cementitious or setting beds
  - 2. Float finish—For walks; steps; and for surfaces intended to receive waterproofing, roofing, insulation, or sand-bed terrazzo
  - 3. Trowel finish—For interior floors
  - 4. Broom finish—For parking slabs and exterior surfaces, including slabs, ramps, walkways, and steps, light broom finish for exterior balconies.
- E. Finish slabs to the following flatness and levelness tolerances:
  - 1.  $F_F35/F_L25$  minimum overall for composite of all measured values and  $F_F24/F_L15$  minimum for any individual floor section.
  - 2. Slabs to receive wood flooring:  $F_F45/F_L30$  minimum overall for composite of all measured values and  $F_F30/F_L20$  minimum for any individual floor section.
  - 3. Architect/Structural Engineer will identify which sections of slabs are to be tested for flatness and levelness.

- a.  $F_L$  values are applicable only if testing is performed within 72 hours of concrete placement, before tensioning of tendons, and before removal of formwork.  $F_L$  values are not applicable to unshored systems.
- b.  $F_F$  values are applicable to all types of slab construction and are not subject to any time constraints.

### 3.11 CURING

- A. Begin curing procedures in accordance with Section 5 of ACI 301 immediately following the commencement of the finishing operation. If bleed water sheen is not visible on surface of concrete after strikeoff and initial bull floating, provide initial curing by means of fogging or application of evaporation retarder until final curing method is applied. Do not use fogging in cold weather concreting.
- B. After the initial curing outlined in A., apply the curing procedure as specified below. Apply curing in a manner that prevents marring, marking, or discoloration of finished surface. The curing methods below refer to ACI 301 (Specifications for Structural Concrete) and ACI 308.1 (Specification for Curing Concrete). The curing methods below are described in detail in these documents and the provisions of the curing method specified shall be adhered to. In addition, ACI 308 (Guide to External Curing of Concrete) may be used as a reference guide.
- C. Wet cure the unformed surface of all interior concrete slabs in accordance with ACI 301 and ACI 308 using either of the three methods below. The requirements for each of these curing methods can be found in Section 3 of ACI 308. Keep the concrete surface continually moist a minimum of seven days. Do not allow the surface to dry or undergo cycles of drying and wetting.
  1. Ponding
  2. Sprinkling
  3. Fogging
- D. If the concrete will be exposed with a polished or stained finish use curing water that is free of substances that will stain or discolor concrete. The staining ability of curing water can be evaluated by means of CRD-C 401.
- E. At the end of the required wet-curing period, cover materials shall be allowed to dry thoroughly before removal to provide uniform, slow drying of the concrete surface. Controlled and gradual termination of wet or moist curing is particularly critical in cold weather when there is a risk of freezing the freshly exposed water-saturated surface. ACI 306R and ACI 301 contain recommendations for gradual termination of curing and protection.
- F. For formed surfaces, unless otherwise specified, if formwork is loosened or removed so that concrete surface is exposed to ambient air less than 7 days from concrete placement continue curing by either continuous fogging, ponding, continuous sprinkling, or a membrane-forming curing compound as described above and in ACI 301 and ACI 308.
- G. Maintain concrete temperature to prevent freezing of concrete and to ensure strength development. Unless otherwise specified, duration of thermal protection shall be at least 3 days.

- H. Maintain curing measures until the concrete has reached a minimum of 70 percent of the specified 28-day strength compressive strength,  $f_c'$ , but not less than 7 days.

### 3.12 CUTTING CONCRETE

- A. Obtain Architect/Structural Engineer's written approval prior to cutting concrete for installation of other work.

### 3.13 PATCHWORK AND REPAIRS

- A. Repair tie holes and other surface defects in formed finishes unless otherwise specified. Where the concrete surface will be textured by sandblasting or bush-hammering, repair surface defects before texturing.
- B. Notify Architect/Structural Engineer of any defective areas (other than tie holes) in concrete to be patched or repaired. Unless otherwise specified or permitted, repair surface defects by the following method. Outline repair area with a 1/2 in. deep saw cut and remove defective concrete down to sound concrete. Leave chipped edges perpendicular to the saw-cut surface or slightly undercut. Do not feather edges. Dampen the area to be patched plus 6 in. around the patch area perimeter. Prepare scrub coat mix using one-part portland cement and one-part sand by loose volume with water. Thoroughly brush scrub coat into the surface. When the scrub coat begins to lose water sheen, apply patching mortar (for concrete exposed to view, mortar shall match adjacent concrete color) and thoroughly consolidate mortar into place. Strike off mortar, finishing flush to the final surface. Leave the patch undisturbed for 1 hour before finishing. Keep the patch damp for 7 days.

END OF SECTION



**SECTION 042000 - UNIT MASONRY****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY****A. Section Includes:**

1. Concrete masonry units.
2. Building (common) brick.
3. Mortar and grout.
4. Masonry-joint reinforcement.
5. Ties and anchors.
6. Embedded flashing.
7. Miscellaneous masonry accessories.

**B. Products Installed but not Furnished under This Section:**

1. Steel lintels in unit masonry.
2. Steel shelf angles for supporting unit masonry.
3. Cavity wall insulation.
4. Section 012100 "Allowance" for face brick allowance.

**1.3 DEFINITIONS**

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

**1.4 PREINSTALLATION MEETINGS**

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

**1.5 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Clay face brick, in the form of straps of five or more bricks.
2. Colored mortar.

D. Samples for Verification: For each type and color of the following:

1. Exposed CMUs.
2. Clay face brick, in the form of straps of five or more bricks.
3. Special brick shapes.
4. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
5. Accessories embedded in masonry.

## 1.6 INFORMATIONAL SUBMITTALS

A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Receipt of list does not constitute approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing. B. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

1. Masonry units.
  - a. Include data on material properties and material test reports substantiating compliance with requirements.
  - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
  - c. For exposed brick, include test report for efflorescence according to ASTM C 67.
  - d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing according to ASTM C 67 or a list of addresses of buildings in Project's area where proposed brick has been used successfully and with a history of durability.
  - e. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.

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

## 1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
1. Build sample panels for typical exterior wall in sizes approximately 48 inches long by 48 inches high by full thickness.
  2. Build sample panels facing south.
  3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
  4. Clean one-half of exposed faces of panels with masonry cleaner indicated.
  5. Protect approved sample panels from the elements with weather-resistant membrane.
  6. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

- a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Build mockups for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness, including face and backup wythes and accessories.
    - a. Include a sealant-filled joint at least 16 inches long in exterior wall mockup.
    - b. Include through-wall flashing installed for a 24-inch length in corner of exterior wall mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit masonry above half of flashing).
  2. Where masonry is to match existing, erect mockups adjacent and parallel to existing surface.
  3. Clean one-half of exposed faces of mockups with masonry cleaner as indicated.
  4. Protect accepted mockups from the elements with weather-resistant membrane.
  5. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
  - B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
  - C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
  - D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

## 1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
  - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
  - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
  - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

### 2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

### 2.3 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
  - 1. Density Classification: Normal weight unless otherwise indicated. See Structural Specifications.
  - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

### 2.4 CONCRETE AND MASONRY LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.5 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
  2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
  3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
  4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work.
  2. Grade: SW.
  3. Type: FBS.
  4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi.
  5. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C 67.
  6. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
  7. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing according to ASTM C 67 with no observable difference in the applied finish when viewed from 10 feet
  8. Size (Actual Dimensions): 3-1/2 inches wide by 2-1/4 inches high by 7-1/2 inches long 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
  9. Application: Use where brick is exposed unless otherwise indicated.

## 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Cemex S.A.B. de C.V.; Citadel, Type S.
    - b. Lehigh Cement Company.; Lehigh Masonry Cement. E. Mortar Cement: ASTM C 1329/C 1329M.
  2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Lafarge North America Inc.; Lafarge Mortar Cement Magnolia Superbond Mortar Cement.
- E. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Davis Colors; True Tone Mortar Colors.
    - b. Lanxess Corporation; Bayferrox Iron Oxide Pigments.
    - c. Solomon Colors, Inc.; SGS Mortar Colors.
- F. Colored Cement Products: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Colored Portland Cement-Lime Mix:
    - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      - 1) Essroc, Italcementi Group; Riverton Portland Cement Lime Custom Color.
      - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
      - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
      - 4) Lehigh Cement Company.; Lehigh Custom Color Portland/Lime Cement.
  2. Colored Masonry Cement:



- a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Cemex S.A.B. de C.V.; Richcolor Masonry Cement.
    - 2) Essroc, Italcementi Group; .
    - 3) Holcim (US) Inc.; Rainbow Mortamix Custom Color Masonry Cement.
    - 4) Lafarge North America Inc.; U.S. Cement Custom Color Masonry Cement.
    - 5) Lehigh Cement Company.; Lehigh Custom Color Masonry Cement.
    - 6) National Cement Company, Inc.; Coosa Masonry Cement.
  3. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
  4. Pigments shall not exceed 10 percent of portland cement by weight.
  5. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
  6. Owner/Architect shall choose color from manufacturers full range of colors.
- G. Aggregate for Mortar: ASTM C 144.
1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
  3. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color. I. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Euclid Chemical Company (The); Accelguard 80.
    - b. Grace Construction Products, W. R. Grace & Co. - Conn.; Morset.
    - c. Sonneborn Products, BASF Aktiengesellschaft; Trimix-NCA. K. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
  1. Interior Walls: Mill- galvanized carbon steel.
  2. Exterior Walls: Hot-dip galvanized carbon steel.

3. Wire Size for Side Rods: 0.187-inch diameter.
4. Wire Size for Cross Rods: 0.148-inch diameter.
5. Wire Size for Veneer Ties: 0.187-inch diameter.
6. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
7. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.

C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

D. Masonry-Joint Reinforcement for Multiwythe Masonry:

1. Adjustable (two-piece) type, either ladder or truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum horizontal play of 1/16 inch and maximum vertical adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face. Ties have hooks or clips to engage a continuous horizontal wire in the facing wythe.

## 2.8 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.

C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.

1. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
2. Wire: Fabricate from 3/16-inch- 1/4-inch- diameter, hot-dip galvanized steel wire. Mill-galvanized wire ties may be used in interior walls unless otherwise indicated.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Tie Section: Triangular-shaped wire tie made from [0.187-inch-0.25-inch-

## 2.9 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Asphalt-Coated Copper Flashing: 7-oz./sq. ft. copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Advanced Building Products Inc.; Cop-R-Cote.
    - 2) Dayton Superior Corporation, Dur-O-Wal Division; Copper Coated Thru-Wall Flashing.
    - 3) Sandell Manufacturing Co., Inc.; Coated Copper Flashing. B.  
Application: Unless otherwise indicated, use the following:
  2. Where flashing is indicated to receive counterflashing, use metal flashing.
  3. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
  4. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
  5. Where flashing is fully concealed, use flexible flashing.
- B. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.10 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

## 2.11 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

## 2.12 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
  2. Use masonry cement or mortar cement mortar unless otherwise indicated.
  3. For exterior masonry, use masonry cement or mortar cement mortar.
  4. For reinforced masonry, use masonry cement or mortar cement mortar.
  5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
1. For masonry below grade or in contact with earth, use Type M or Type S.
  2. For reinforced masonry, use Type S or Type N.
  3. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
  4. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
  2. Pigments shall not exceed 5 percent of masonry cement by weight.
  3. Mix to match Architect's sample.
  4. Application: Use pigmented mortar for exposed mortar joints with the following units:
    - a. Clay face brick.
    - b. Glazed structural clay facing tile.
    - c. Cast-stone trim units.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match Architect's sample.
  2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:

- a. Clay face brick.
- b. Glazed structural clay facing tile.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- G. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq.

in. per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

### 3.3 TOLERANCES

#### Dimensions and Locations of Elements:

For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.

For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.

For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

#### A. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

#### B. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

### 3.4 LAYING MASONRY WALLS

Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets.

Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- A. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- B. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4 inches. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- F. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- G. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- H. Build nonload-bearing interior partitions full height of story to underside of roof structure above unless otherwise indicated.
  - 1. Install compressible filler in joint between top of partition and underside of structure above.
  - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 32 inches o.c. unless otherwise indicated.
  - 3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
  - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078443 "Joint Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

Lay CMUs as follows:

Bed face shells in mortar and make head joints of depth equal to bed joints.

Bed webs in mortar in all courses of piers, columns, and pilasters.

Bed webs in mortar in grouted masonry, including starting course on footings.

Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- C. Cut joints flush where indicated to receive cavity wall insulation unless otherwise indicated.

### 3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together using one the following method:
  - 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
    - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
- B. Bond wythes of cavity walls together using bonding system indicated on Drawings.
- C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

### 3.7 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
  - 1. Space reinforcement not more than 16 inches o.c.
  - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
  - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.



- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

### 3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement. B. Form control joints in concrete masonry as follows:
  - 1. Install preformed control-joint gaskets designed to fit standard sash block.
  - 2. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant. C. Form expansion joints in brick as follows:
    - 3. Build flanges of factory-fabricated, expansion-joint units into masonry.
    - 4. Build in compressible joint fillers where indicated.
    - 5. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."
- B. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch.
  - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

### 3.9 LINTELS

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

### 3.10 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn flashing up approximately 2 inches on interior face.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Leading edge of through wall flashing shall stop 1/4" from face of brick veneer, and shall be concealed from view with mortar. Contractor shall not cover flashing until inspected by Architect.

- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

### 3.11 REINFORCED UNIT MASONRY INSTALLATION

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

### 3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Contractor will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense. See Structural Drawings and Notes.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
  - 1. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C 67 for compressive strength.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

### 3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.
7. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

### 3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  1. Crush masonry waste to less than 4 inches in each dimension.
  2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
  3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

## SECTION 042200: CONCRETE UNIT MASONRY

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 032000 – Concrete Reinforcing.
- C. Section 033000 – Cast-in-Place Concrete.
- D. Section 042000 – Unit Masonry.

## 1.2 REFERENCES

TMS 602 – Specification for Masonry Structures.

ASTM A82 – Standard Specification for Steel Wire, Plain, for Concrete Reinforcement.

ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

ASTM A951 - Standard Specification for Steel Wire for Masonry Joint Reinforcement

ASTM C90 – Standard Specification for Loadbearing Concrete Masonry Units.

ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).

ASTM C140 – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.

ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.

ASTM C270 – Standard Specification for Mortar for Unit Masonry.

ASTM C404 – Standard Specification for Aggregates for Masonry Grout.

ASTM C476 – Standard Specification for Grout for Masonry.

ASTM C1019 – Standard Test Method for Sampling and Testing Grout.

ASTM C1314 – Standard Test Method for Compressive Strength of Masonry Prisms.

ASTM D2000 - Standard Classification System for Rubber Products in Automotive Applications.

ASTM D2287 – Standard Specification for Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds.

### 1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in Structural Drawings for additional submittal requirements.
- B. Submit coarse grout mix design.
- C. Shop Drawings: Submit for masonry reinforcement complying with Section 032000.
- D. Submit procedures for construction of masonry walls to be filled with coarse grout. Procedures should include low lift grouting as applicable to Project.

### 1.4 QUALITY ASSURANCE

- A. Masonry construction and materials shall conform to all the requirements of TMS 602, except as modified by the requirements of the Construction Documents.
- B. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store materials in a dry condition to protect from elements and prevent contamination, deterioration, or damage due to moisture, temperature changes, contaminants, corrosion, and other causes.

## PART 2 PRODUCTS

### 2.1 CONCRETE MASONRY

- A. Specified Compressive Strength,  $f'm$ : See Structural Notes in the Structural Drawings.

### 2.2 CONCRETE MASONRY UNITS

- A. Concrete masonry units: Comply with ASTM C90.
- B. Weight: Lightweight.
- C. Net Area Compressive Strength of unit: As listed in Table 2 of TMS 602 required for the specified  $f'm$ .
- D. Face Dimensions: 16" long x 8" high nominal, unless indicated otherwise.
- E. Special shapes: Where indicated on the Drawings.
- F. Fire Rating: Where indicated in the Architectural Drawings, provide concrete masonry units that comply with the specified fire ratings.

### 2.3 MORTAR

- A. Mortar: Type M or Type S in accordance with ASTM C270. Refer to Structural Drawings for locations.
- B. Do not use admixtures that contain chlorides.

### 2.4 COARSE GROUT

- A. Coarse Grout: In accordance with ASTM C476.
- B. Compressive Strength: See Structural Notes in the Structural Drawings.
- C. Slump: 8 and 11 inches.
- D. Do not use admixtures that contain chlorides.

### 2.5 WATER

- A. Water: Clean potable water free of deleterious substances.

### 2.6 REINFORCEMENT

- A. Horizontal and Vertical Reinforcing Bars: Comply with Section 032000.

### 2.7 HORIZONTAL JOINT REINFORCEMENT

- A. Horizontal Joint Reinforcement: Manufactured with longitudinal, parallel, deformed side wires in accordance with ASTM A951 and of the size specified in the Structural Drawings. Cross wires shall be No. 9 gage, plain, in accordance with ASTM A82, unless noted otherwise in Structural Drawings.
- B. Provide as a minimum, one side wire for each face shell of hollow masonry units. Provide additional side wires or eye sections for adjustable wall ties as specified for multiwythe wall construction.
- C. Ladder type reinforcement shall be used in walls with vertical reinforcement.
- D. Finish: Hot-dipped galvanized in accordance with ASTM A153, Class B-2.
- E. Provide prefabricated corner and tee section accessories.

### 2.8 CONTRACTION JOINT MATERIAL

- A. Contraction joint material:
  - 1. Rubber shear keys complying with ASTM D2000, M2AA-805 and with a minimum durometer hardness of 80, or
  - 2. PVC shear keys complying with ASTM D2287, Type PVC 654-4 and with a minimum durometer hardness of 85.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Cold weather masonry construction shall comply with TMS 602, Section 1.8, Paragraph C when either of the following conditions exist:
  - 1. The ambient air temperature falls below 40 degrees Fahrenheit, or
  - 2. The temperature of masonry units is below 20 degrees Fahrenheit.
- B. Hot weather masonry construction shall comply with TMS 602, Section 1.8, Paragraph D when either of the following conditions exist:
  - 1. The ambient air temperature exceeds 100 degrees Fahrenheit, or
  - 2. The ambient air temperature exceeds 90 degrees Fahrenheit with a wind velocity greater than 8 mph.
  - 3. When the ambient temperature exceeds 115 degrees Fahrenheit, or exceeds 105 degrees Fahrenheit with a wind velocity greater than 8 mph, implement the requirements of Article 1.8 D.1.a and shade materials and mixing equipment from direct sunlight.

### 3.2 CONCRETE MASONRY UNIT PLACEMENT

- A. Use dry masonry units. No frozen or wet units shall be used.
- B. Discard cracked, chipped, and spalled masonry units.
- C. Lay hollow units as follows:
  - 1. With full mortar coverage on horizontal and vertical face shells.
  - 2. Bed webs in mortar in starting course on footings and in all courses of piers, columns, pilasters, and in walls where adjacent to cells or cavities to be filled with grout.
  - 3. For starting course on footings where cells are not to be grouted, spread out full mortar bed including area under cells.
  - 4. Maintain joint widths indicated, except for minor variations to maintain joint alignment. If not indicated, lay walls with 3/8 inch joints.
  - 5. Buttering corners of joints, deep or excess furrowing of mortar joints is not permitted.
- D. Lay units in running bond, unless noted otherwise in the Structural Drawings.
- E. Fully bond external corners of concrete masonry.
- F. Where non-loadbearing masonry partitions extend to underside of floor, roof deck or structural system, stop masonry short 3/8 inch to 1/2 inch to allow for live load deflection. Fill gap with soft joint filler.

### 3.3 GROUT PLACEMENT

- A. Execute placement of grout in accordance with TMS 602, Section 3.5.
- B. Place coarse grout in maximum 4'-0" lifts, unless specifically approved in writing by the Architect/Structural Engineer.



- C. Do not fill reinforced cells with mortar.

### 3.4 MOVEMENT JOINTS

- A. Place expansion joints at locations indicated in the Structural Drawings.
  - 1. Do not run any horizontal reinforcing through expansion joints.
- B. Place contraction joints at locations indicated in the Structural Drawings.
  - 1. Install contraction joint material.
  - 2. Do not run horizontal reinforcement through contraction joints, except reinforcement in bond beams at floor and roof levels shall be continuous across contraction joints.

### 3.5 REINFORCEMENT

- A. Place reinforcing bars as indicated in the Structural Drawings and in accordance with TMS 602, Section 3.4.

### 3.6 HORIZONTAL JOINT REINFORCEMENT

- A. Place horizontal joint reinforcement in the horizontal mortar beds at spacings noted in the Structural Drawings and noted below.
- B. For masonry below grade, space horizontal joint reinforcing at 8 inches vertically.
- C. Place horizontal joint reinforcement above lintels and below sills at openings. Extend two feet beyond opening.
- D. Joint reinforcement shall be continuous. Lap joint reinforcement a minimum of 6 inches.

### 3.7 ERECTION BRACING

- A. Design, provide, and install temporary erection bracing during construction as required to stabilize erected masonry until complete structural system is constructed.

### 3.8 CLEANING AND POINTING

- A. Dry brush masonry surfaces before mortar has set hard to remove mortar crumbs and accumulation.
- B. Clean masonry with commercial brick cleaner approved by brick manufacturer. Protect other work from cleaning materials.
- C. Cut out defective mortar and repoint.

### 3.9 PROTECTION OF FINISHED WORK

- A. During erection cover top of wall, projections, and sills with strong waterproof membrane at end of each day's work.
  - 1. Extend and secure cover a minimum of 24 in. down both sides.

- B. Do not apply uniform floor or roof loading for at least 12 hours after placing masonry columns or walls.
- C. Do not apply concentrated loads for at least 3 days after building masonry columns or walls.

END OF SECTION

## SECTION 051200: STRUCTURAL STEEL FRAMING

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 052100 – Steel Joist Framing.
- C. Section 053100 – Steel Decking.

## 1.2 REFERENCES

AISC – Steel Construction Manual, 14<sup>th</sup> Edition.

AISC 303 – Code of Standard Practice for Steel Buildings and Bridges.

AISC 341-10 – Seismic Provisions for Structural Steel Buildings dated June 22, 2010.

AISC 360-10 – Specification for Structural Steel Buildings.

AISC – Specification for Structural Joints Using ASTM A325 or A490 Bolts prepared by the Research Council on Structural Connections.

AWS D1.1 – Structural Welding Code.

AWS A5.1 – Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding.

AWS A5.5 – Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding.

AWS A5.17 – Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.

AWS A5.20 – Carbon Steel Electrodes for Flux Cored Arc Welding.

SSPC – Steel Structures Painting Manual.

ASTM A6 – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.

ASTM A29 - Standard Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for Grades 1010 through 1020.

ASTM A36 – Standard Specification for Carbon Structural Steel.

ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.

ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength.

ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat-Treated, 150 KSI Minimum Tensile Strength.

ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

ASTM A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.

ASTM A563 – Standard Specification for Carbons and Alloy Steel Nuts

ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium Vanadium Structural Steel.

ASTM A673 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel

ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.

ASTM A992 – Standard Specification for Structural Steel Shapes.

ASTM A1085 – Standard Specification for Cold-Formed Welded Carbon Steel Hollow Structural Sections (HSS)

ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel

ASTM F436 – Standard Specification for Hardened Steel Washers.

ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.

ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-Ksi Yield Strength.

ASTM F1852 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

ASTM F2280 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 150 ksi Minimum Tensile Strength.

### 1.3 SUBMITTALS

- A. Refer to Structural Quality Assurance Plan in the Structural Drawings for additional submittal requirements.
- B. Shop Drawings:
  - 1. Contact Structural Engineer's Construction Administrator prior to detailing structural steel shop drawings.
  - 2. Shop drawings shall be submitted on a 24" x 36" sheet minimum.
  - 3. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacing and locations of structural steel members, including connections, attachments, anchorages, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the stud shear connectors and headed studs.
  - 4. Beam sizes shall be shown on the erection drawings (plans).
  - 5. Submit shop drawings for review.
  - 6. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files will not be provided to the Contractor.
- C. Maintain at construction office written welding procedures for each type of welded joint used in accordance with AWS D1.1.
- D. Submit certification that the fabricator meets the required qualifications and ultrasonic testing reports for complete penetration welds. If fabricator has an independent testing agency inspect fabrication as required by these specifications, submit the name and qualifications of the independent testing agency.
- E. Upon request, submit the erection sequence and procedures to be used by the steel erector.
- F. Submit certification that the erector meets the required qualifications.

### 1.4 QUALITY ASSURANCE

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.

### 1.5 STORAGE

- A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

### 1.6 FABRICATOR'S QUALIFICATIONS

- A. Steel fabricator shall meet the requirements in the Structural Quality Assurance Plan in the Structural Drawings.

### 1.7 ERECTOR'S QUALIFICATIONS

- A. Steel fabricator shall meet the requirements in the Structural Quality Assurance Plan in the Structural Drawings

- B. Erector shall be experienced in erecting structural systems similar in complexity to this Project as evidenced by 10 completed projects.
- C. Erector shall have a minimum of 5 years experience in the erection of structural steel or is an AISC Certified Advanced Steel Erector.
- D. For qualification of welders, refer to the Structural Quality Assurance Plan in the Structural Drawings.

## PART 2 PRODUCTS

### 2.1 ANCHOR RODS

- A. Anchor Rods: Headed rod or a threaded rod with a heavy hexagonal nut and plate washer welded to the bottom of the threaded rod conforming to ASTM F1554.
- B. Nuts and Washers: Two hexagonal nuts and two plate washers conforming to ASTM A36 for each anchor rod assembly.

### 2.2 ROLLED STEEL SHAPES, PLATES, AND BARS

- A. Rolled Steel Shapes, Plates, and Bars: ASTM A36; ASTM A572, Grade 50; or ASTM A992 as indicated by the Structural Drawings. ASTM A572, Grade 50 may be substituted for ASTM A992.

### 2.3 SQUARE, RECTANGULAR AND ROUND STEEL HOLLOW STRUCTURAL SECTIONS (HSS)

- A. Hollow structural sections:
  - 1. Rectangular and Square: ASTM A500 Grade B, 46 ksi minimum yield strength
  - 2. Round: ASTM A500 Grade B, 42 ksi minimum yield strength

### 2.4 PIPE STEEL STRUCTURAL SECTIONS

- A. Pipe Structural Sections: ASTM A53, Gr. B, 35 ksi minimum yield strength.

### 2.5 NON-HIGH-STRENGTH FASTENERS

- A. Non-High-Strength Bolts: ASTM A307, Grade A, 60 ksi minimum, where noted on the Structural Drawings.
- B. Hardened Steel Washers: ASTM F436.

### 2.6 HIGH-STRENGTH FASTENERS

- A. High-Strength Bolts: ASTM A325 or ASTM A490 as noted on the Structural Drawings. 3/4-inch minimum diameter.
- B. Hardened steel washers shall conform to ASTM F436.
- C. Spline-Type Tension Control Bolts: ASTM spline-type tension control bolts with plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.

- D. Do not use load indicating washers.
- 2.7 EXPANSION ANCHORS
- A. Expansion Anchors: See Structural Notes.
- 2.8 ADHESIVE ANCHORS
- A. Adhesive Anchors: See Structural Notes.
- 2.9 SCREW ANCHORS
- A. Screw Anchors: See Structural Notes.
- 2.10 HEADED STUDS
- A. Headed Studs: shall conform to the requirements of AWS D1.1. Provide studs with the diameter shown on the Structural Drawings.
- 2.11 STUD SHEAR CONNECTORS
- A. Stud Shear Connectors: ASTM A108, 3/4-inch diameter in compliance with AWS D1.1.
- 2.12 WELD ELECTRODES
- A. Weld Electrodes: AWS A5.1, A5.5, A5.17, or A5.20 E-70 series low hydrogen electrodes.
  - B. Provide E-70 series, low hydrogen electrodes with a minimum Charpy V-Notch (CVN) toughness of 20 ft.-lb. at 0 degrees Fahrenheit and 40 ft.-lb. at 70 degrees Fahrenheit for demand critical welds. Refer to the Structural Drawings for locations of demand critical welds.
  - C. Properly store electrodes to maintain flux quality.
- 2.13 PAINT
- A. Oxide Primer: AISC Specifications, Code of Standard Practice, and SSPC Steel Structure Painting Manual, unless indicated otherwise.
  - B. Paint Primer: Free of lead and chromate and comply with State and Federal volatile organic compound (VOC) requirements.
  - C. Paint Primer: Compatible with finish coating.
- 2.14 GALVANIZE
- A. Galvanized Coating: ASTM A123.
  - B. Galvanize Bolts, Nuts, and Washers: ASTM A153 when used to connect steel members that are specified to be galvanized.
  - C. Expansion Anchors, Adhesive Anchors, or Screw Anchors: Where specified to be galvanized, anchors shall be mechanically galvanized in accordance with ASTM B695, Class 65, Type I.

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.
- B. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

### 3.2 ANCHOR ROD SETTING

- A. Provide templates for setting anchor rods. Position anchor rods by using templates with two nuts to secure in place prior to placement of concrete.
- B. Do not erect steel where anchor rod nuts will not have full threads.

### 3.3 CONNECTIONS

- A. Provide a minimum of two fasteners at each bolted connection.
- B. Ensure fasteners are lubricated prior to installation.
- C. Provide high-strength bolted connections in accordance with AISC Specifications for Structural Joints using ASTM A325 or A490 Bolts.
- D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

### 3.4 FASTENER INSTALLATION

- A. Bolts shall be installed in holes of the connection and brought to snug tight condition. Tighten connection progressing systematically from the most rigid part to the free edges of the connection to minimize relaxation of the bolts.
- B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.
- C. Installation and tightening of bolts shall conform to the AISC Specifications for Structural Joints.

### 3.5 EXPANSION ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.
- B. Minimum Embedment: See Structural Notes on Drawings.

### 3.6 ADHESIVE ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR or IAPMO-UES report for the particular anchor used.



- B. Minimum Embedment: See Structural Notes on Drawings.

### 3.7 SCREW ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation and the ICC ESR report for the particular anchor used.
- B. Minimum Embedment: See Structural Notes on Drawings.

### 3.8 HEADED STUDS

- A. Headed studs shall be installed in accordance with AWS D1.1 with the resulting in-place length after burn-off as shown on the Structural Drawings.
- B. Do not locate headed studs closer than 1-1/4 inches from the edge of embedded steel member to the centerline of the stud.
- C. Remove ceramic arc shields after welding studs.

### 3.9 WELDING

- A. Comply with AWS D1.1. Use prequalified weld procedures.
- B. Provide end returns where fillet welds terminate at ends or sides. Returns shall be continuous for a distance of not less than two times the nominal size of the weld.
- C. Complete penetration joints shall be backgouged to sound metal before the second side is welded or have 1/4-inch root opening with 3/16 x 1 inch backing bar. Access holes are required. Filling access holes is not required.
- D. Remove all slag and weld splatter from deposited weld metal.

### 3.10 SPLICING

- A. Splice members only where indicated unless authorized in writing by Structural Engineer.
- B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

### 3.11 CUTTING

- A. Do not use flame cutting to correct errors unless authorized in writing.
- B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

### 3.12 MILL SCALE

- A. Remove loose mill scale.

### 3.13 BOLT HOLES

- A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

### 3.14 PAINTING

- A. Paint steel that is not encased in concrete, plaster, or sprayed fireproofing. Do not shop paint in areas to be field welded, contact surfaces of slip critical connections, or areas to receive special finishes.
- B. Field paint as required steel that has been welded or that is unpainted after connections have been tightened.

### 3.15 GALVANIZING

- A. Galvanize shelf angles that support the exterior building veneer, for example brick shelf angles.
- B. Galvanize environmentally exposed steel, for example mechanical equipment supports.
- C. Touch-up welds and abrasions in galvanized members in accordance with ASTM A780.

END OF SECTION

## SECTION 053100: STEEL DECKING

## PART 1 GENERAL

## 1.1 RELATED SECTIONS

- A. Division 1 Sections
- B. Section 051200 – Structural Steel Framing.
- C. Section 052100 – Steel Joist Framing.

## 1.2 REFERENCES

AISI – Specifications for the Design of Cold-Formed Steel Structural Members.

AWS D1.1 – Structural Welding Code.

AWS A5.5 – Specifications For Low Alloy Steel Covered Arc-Welding.

SDI 31 – Design Manual for Composite Decks, Form Decks, and Roof Decks

SDI RDCH1 – Roof Deck Construction Handbook

SDI DDMO3 – Diaphragm Design Manual, Third Edition

ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

ASTM A1008 – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

ASTM C1513 – Standard Specification for Steel Tapping Screws for Cold-Formed Steel-Framing Connections.

## 1.3 SUBMITTALS

- A. Notify the Structural Engineer prior to detailing shop drawings.
- B. Submit detailed shop drawings showing layout and types of deck panels, weld sizes, weld patterns and conditions requiring closure panels, supplementary framing, sump pans, cant strips, cut openings, special jointing or other accessories.
- C. Submit manufacturer's information including section properties, deck gage, material yield strength, etc. for each type of steel deck required. The submittal shall demonstrate that the deck complies with the minimum section and material properties indicated in the structural notes and this Specification.
- D. Submit supporting documentation and manufacturer's information for deck that does not comply with the minimum section and material properties specified. Deck shall be

designed for the design criteria outlined herein and the submittal shall be stamped and signed by an Engineer licensed in the project state.

- E. Upon request, submit mill certification that the steel supplied meets these Specifications.
- F. Upon request, submit written welding procedures.
- G. Submit manufacturer's certification of compliance with supplementary framing, sump pans, cant strips, curb openings, special jointing and other accessories.

#### 1.4 QUALITY ASSURANCE

- A. Refer to the Structural Quality Assurance Plan in the Structural Drawings.
- B. Welders shall be certified by AWS for the welding process involved.
- C. Fire Rated Assemblies: For steel decking that is a part of a specified fire rated assembly, identify steel deck bundles with labels bearing the U.L. mark.

#### 1.5 STORAGE

- A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

### PART 2 PRODUCTS

#### 2.1 GENERAL

- A. Provide steel deck sheets of three spans minimum wherever possible.

#### 2.2 DECK ATTACHMENT

- A. Use E-60 series electrodes conforming to AWS A5.5.
- B. Provide weld washers for material thinner than 22 gage.
- C. Provide screws conforming to ASTM C1513.

#### 2.3 ROOF DECK

- A. Roof Deck: Steel sheets, minimum yield strength of 33,000 pounds per square inch, ASTM A653, Grade 33 or higher, deck types and gages as indicated on Drawings.
- B. Finish: Galvanized, G60 coating.
- C. End and Side Laps: 2-inch flush, nested unless otherwise indicated or specified.

#### 2.4 ROOF SUMP PANS

- A. Roof Sump Pans: Single piece of 14 gage galvanized sheet steel with level bottoms and sloping sides to direct water flow to drain, when required by Architect. Size to receive roof drains and with bearing flanges not less than 3 inches wide

## PART 3 EXECUTION

### 3.1 GENERAL

- A. Installer must examine the areas and conditions under which metal decking is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.
- B. Steel deck shall be installed in accordance with the approved shop drawings, requirements of the Steel Deck Institute, the manufacturer's recommendations, and any applicable regulatory, safety guidelines.

### 3.2 PLACEMENT

- A. Place steel deck units on supporting steel framework and adjust to final position before permanently fastening. Install deck units and accessories in accordance with manufacturer's recommendations and the Drawings, and as specified herein.

### 3.3 CUTTING

- A. Cut holes in deck indicated by the Drawings. Other holes required shall be supplied by those requiring them. Obtain written authorization for additional holes and cutting not indicated on erection drawings.

### 3.4 WELDING

- A. Perform welding in accordance with AWS Structural Welding Code.
- B. Install weld washers for deck thinner than 22 gage.

### 3.5 CONCENTRATED LOADS

- A. Concentrated loads suspended from the steel deck shall not exceed 50 pounds. No more than one suspended load shall be located in the sheet width in any span.

### 3.6 DECK SUPPORTS

- A. Fasten deck to steel framework at ends and at each intermediate support by welding according to manufacturer's specifications unless indicated otherwise on structural drawings or otherwise specified herein. Do not weld deck in place until all bolted and welded connections for the structural frame are complete. A minimum of one floor over the area to be decked is to be bolted and welded prior to welding deck in place.

### 3.7 ROOF DECK

- A. Place roof deck in straight alignment. Lap ends of sheets two inches.
- B. Attach side laps of roof deck with screws spaced at a maximum of 24 inches on center for spans greater than 4 feet unless shown otherwise on the Drawings.
- C. Weld roof deck in place by welding with 5/8-inch puddle welds spaced 12 inches on center at each support, unless shown otherwise by the Drawings.

- D. Where screws are required in the drawings, screw fasteners shall extend through the steel connection a minimum of three exposed threads.

3.8 ROOF SUMP PANS

- A. Recess pans not less than 1½ inches below roof deck surface, unless otherwise shown or required by deck configuration. Holes for drains will be cut in the field.

END OF SECTION

**SECTION 055000 - METAL FABRICATIONS****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. Metal ladders.
- 2. Metal bollards.

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

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

**C. Related Requirements:**

- 1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
- 2. Section 042000 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.

**1.3 COORDINATION**

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. 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.

#### 1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
1. Steel framing and supports for mechanical and electrical equipment.
  2. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  3. Steel pipe columns for supporting wood frame construction.
  4. Metal ladders.
  5. Ladder safety cages.
  6. Metal bollards.
  7. guards.

#### 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

#### 1.6 FIELD CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

#### 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.



- C. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

### 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
  - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

### 2.4 MISCELLANEOUS MATERIALS

- A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting." Section 099123 Interior Painting."
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

- F. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

## 2.5 FABRICATION, GENERAL

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

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
  - 1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
  - 2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.
- D. Prime miscellaneous framing and supports with where indicated.

## 2.7 METAL LADDERS

- A. General:
  - 1. Comply with ANSI A14.3.
- B. Steel Ladders:
  - 1. Space siderails 18 inches apart unless otherwise indicated.
  - 2. Siderails: Continuous, 3/8-by-2-1/2-inch 1/2-by-2-1/2-inch steel flat bars, with eased edges.
  - 3. Rungs: 3/4-inch- diameter 1-inch- diameter steel bars.
  - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  - 5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
  - 6. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
  - 7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
  - 8. Galvanize and prime ladders, including brackets.
  - 9. Prime exterior ladders, including brackets and fasteners, with primer specified in Section 099600 "High-Performance Coatings."

## 2.8 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe Schedule 80 steel pipe 1/4-inch wall-thickness rectangular steel tubing steel shapes, as indicated.
  - 1. Cap bollards with 1/4-inch- thick steel plate.
  - 2. Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
  - 3. Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- B. Fabricate bollards with 3/8-inch- thick steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
  - 1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- C. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch wall-thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch steel machine bolt.

## 2.9 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.10 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items[ not indicated to be galvanized] unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with universal shop primer primers specified in Section 099113 "Exterior Painting" primers specified in Section 099123 "Interior Painting" unless zinc-rich primer is primers specified in Section 099600 "High-Performance Coatings" are indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

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

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

### 3.3 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

- B. Anchor bollards in concrete . Fill annular space around bollard solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
- C. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.
- E. Fill bollards solidly with concrete, mounding top surface to shed water.
  - 1. Do not fill removable bollards with concrete.

#### 3.4 ADJUSTING AND CLEANING

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

END OF SECTION

**SECTION 055213 - PIPE AND TUBE RAILINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 COORDINATION**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Railing brackets.
  - 3. Grout, anchoring cement, and paint products.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Welding certificates.

- B. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.
- C. Evaluation Reports: For post-installed anchors , from ICC-ES.

## 1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 1.8 FIELD CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Infill of Guards:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
    - b. Infill load and other loads need not be assumed to act concurrently.

### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.



- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

## 2.3 STEEL AND IRON

- A. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

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

## 2.4 FASTENERS

- A. General: Provide the following:

1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5 for zinc coating.
2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

- C. Fasteners for Interconnecting Railing Components:

1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
3. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.

- D. Post-Installed Anchors: Torque-controlled expansion anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  1. For railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
  1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.6 FABRICATION

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

- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- I. Form Changes in Direction as Follows:
  - 1. By bending or by inserting prefabricated elbow fittings.
- J. For changes in direction made by bending, use jigs to produce uniform curvature for each repetitive configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- M. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
  - 1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- N. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
- O. For railing posts set in concrete, provide steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.

## 2.7 STEEL AND IRON FINISHES

- A. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves; however, galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 1. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Railings Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Other Railings: SSPC-SP 3, "Power Tool Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
  - 1. Shop prime uncoated railings with universal shop primer unless indicated.
- D. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
  - 1. Color: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

- C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
  - 1. Coat, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

### 3.3 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material.
- D. Leave anchorage joint exposed with anchoring material flush with adjacent surface.

### 3.4 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and connected to railing ends using nonwelded connections.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and .
- C. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.

### 3.5 ADJUSTING AND CLEANING

- A. Clean by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
  1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

### 3.6 PROTECTION

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

END OF SECTION

**SECTION 061000 - ROUGH CARPENTRY****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

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

**1.3 DEFINITIONS**

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal 5 inches nominal Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. RIS: Redwood Inspection Service.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- B. Fastener Patterns: Full-size templates for fasteners in exposed framing.

## 1.5 INFORMATIONAL SUBMITTALS

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

## 1.6 QUALITY ASSURANCE

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

## 1.7 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
  - 1. Dimension lumber framing.
  - 2. Miscellaneous lumber.



- B. 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, omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
- D. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2[ for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground].
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency. D. Application: Treat items indicated on Drawings, and the following:

2. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
3. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
4. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- 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 WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  2. Use inorganic boron for items that are continuously protected from liquid water. 3. Use copper naphthenate for items not continuously protected from liquid water.
- 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.

- H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
  - 1. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

END OF SECTION



**SECTION 061600 - SHEATHING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Wall sheathing.
  - 2. Sheathing joint and penetration treatment.
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry" .

**1.3 ACTION SUBMITTALS**

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

**1.4 DELIVERY, STORAGE, AND HANDLING**

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

**PART 2 - PRODUCTS****2.1 WOOD PANEL PRODUCTS**

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.
  - 1. .

## 2.2 WALL SHEATHING

### A. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. CertainTeed Corporation; GlasRoc.
  - b. G-P Gypsum Corporation; Dens-Glass Gold.
  - c. National Gypsum Company; Gold Bond e(2)XP.
2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches for vertical installation.

## 2.3 FASTENERS

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

1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

### B. Nails, Brads, and Staples: ASTM F 1667.

### C. Wood Screws: ASME B18.6.1.

### D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

## 2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

### A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
  - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
  - 1. Fasten gypsum sheathing to wood framing with screws.
  - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
  - 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
  - 4. Install boards with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.
- C. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
- D. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
  2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION



**SECTION 072100 - THERMAL INSULATION****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

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

- B. Related Requirements:

1. Section 042000 "Unit Masonry" for insulation installed in masonry cells.
2. Section 061600 "Sheathing" for foam-plastic board sheathing installed directly over wood or steel framing.
3. for insulated drainage panels installed with plaza deck insulation.
4. for insulation specified as part of roofing construction.
5. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

**1.3 ACTION SUBMITTALS**

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

**1.4 INFORMATIONAL SUBMITTALS**

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

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

## PART 2 - PRODUCTS

### 2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board, Type X : ASTM C 578, Type X, 15-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company (The).
    - c. Owens Corning.

### 2.2 GLASS-FIBER BLANKET

- A. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
  - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
  - 2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
- B. Glass-Fiber Blanket, Kraft Faced ASTM C 665, Type II (nonreflective faced), Class C (faced surface not rated for flame propagation); Category 1 (membrane is a vapor barrier).
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. CertainTeed Corporation.
    - b. Johns Manville; a Berkshire Hathaway company.
    - c. Owens Corning.

### 2.3 INSULATION FASTENERS

- A. Provide poultry mesh (chicken wire) to support batt insulation in stud cavities higher than 96 inches, where stud cavity is open on one or both sides.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

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

### 3.3 INSTALLATION OF CAVITY-WALL INSULATION

- A. Foam-Plastic Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.

### 3.4 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
  - a. Exterior Walls: Set units with facing placed toward exterior of construction.
  - b. Interior Walls: Set units with facing placed toward areas of high humidity.

### 3.5 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

## SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Section Includes:
  - 1. High-build air barriers, vapor retarding.

#### 1.2 DEFINITIONS

- A. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- B. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- C. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site]** <Insert location>.
  - 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.
  - 1. High-build air barriers, vapor retarding.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.
- B. Field quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - 1. Installer to be licensed by ABAA in accordance with ABAA's Quality Assurance Program and to employ ABAA-certified installers and supervisors on Project.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
  - 1. Protect substrates from environmental conditions that affect air-barrier performance.
  - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

## PART 2 - PRODUCTS

### 2.1 SOURCE LIMITATIONS

- A. Obtain primary air-barrier materials and air-barrier accessories from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction to be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies to be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.
- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested in accordance with ASTM E2357.

- C. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. pressure difference; ASTM E2178.
- D. Ultimate Elongation: Minimum 1500 percent; ASTM D412, Die C.
- E. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

### 2.3 HIGH-BUILD AIR BARRIERS, VAPOR RETARDING

- A. High-Build, Vapor-Retarding Air Barrier, Modified Bituminous Type: Modified bituminous membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Carlisle Coatings & Waterproofing Inc.
    - b. Henry Company.
    - c. Tremco Incorporated.
    - d. W. R. Meadows, Inc.
- B. Vapor Permeance: Maximum 0.1 perm; ASTM E96/E96M, Procedure B, Water Method.

### 2.4 ACCESSORY MATERIALS

- A. Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, 0.0187 inch thick, and Series 300 stainless steel fasteners.
- C. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.
  - 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. GE Construction Sealants; Momentive Performance Materials Inc.
    - b. Pecora Corporation.

- c. The Dow Chemical Company.
- d. Tremco Incorporated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
  - 3. Verify that substrates are visibly dry and free of moisture.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate in accordance with manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge isolation joints, discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement in accordance with manufacturer's written instructions and details.



### 3.3 INSTALLATION OF ACCESSORIES

- A. Install accessory materials in accordance with air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
  - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
  - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
  - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
  - 1. Transition Strip: Roll firmly to enhance adhesion.
  - 2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.
- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, transition strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

### 3.4 INSTALLATION OF PRIMARY AIR-BARRIER MATERIAL

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier in accordance with air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
  - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
  - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
  - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
  - 1. Vapor-Retarding, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils, applied in two equal coats.
- C. Do not cover air barrier until it has been tested and inspected by testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

### 3.5 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
  - 1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
  - 2. Air-barrier dry film thickness.
  - 3. Continuous structural support of air-barrier system has been provided.
  - 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

5. Site conditions for application temperature and dryness of substrates have been maintained.
6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

D. Tests: As determined by testing agency from among the following tests:

1. Air-Leakage-Location Testing: Air-barrier assemblies will be tested for evidence of air leakage in accordance with ASTM E1186, chamber pressurization or depressurization with smoke tracers.
2. Air-Leakage-Volume Testing: Air-barrier assemblies will be tested for air-leakage rate in accordance with ASTM E783.
3. Adhesion Testing: Air-barrier assemblies will be tested for required adhesion to substrate in accordance with ASTM D4541 for each 600 sq. ft. of installed air barrier or part thereof.

E. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, in accordance with manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

F. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

G. Prepare test and inspection reports.

### 3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials in accordance with air-barrier manufacturer's written instructions.
  2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION

**SECTION 075552 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING****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. 2-ply Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing.
2. Roof insulation.
3. Cover Board

**B. Related Sections:**

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blockingSection 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
2. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation

**1.3 DEFINITIONS**

- A. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus 25 deg F, measured at the mop cart or mechanical spreader immediately before application.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
  - 1. Corner Uplift Pressure: As indicated on Structural Drawings.
  - 2. Perimeter Uplift Pressure: As indicated on Structural Drawings.
  - 3. Field-of-Roof Uplift Pressure: As indicated on Structural Drawings.
- D. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail Resistance Rating: MH.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Base flashings and membrane terminations.
  - 2. Tapered insulation, including slopes.
  - 3. Crickets, saddles, and tapered edge strips, including slopes.
  - 4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer, manufacturer, and testing agency.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of complying with performance requirements.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
  - D. Research/Evaluation Reports: For components of membrane roofing system, from IBC 2012.
  - E. Warranties: Sample of special warranties.
- 1.7 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For roofing system to include in maintenance manuals.
- 1.8 QUALITY ASSURANCE
- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed and FM Approvals approved for membrane roofing system identical to that used for this Project.
  - B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
  - C. Source Limitations: Obtain components including roof insulation fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
  - D. Preinstallation Roofing Conference: Conduct conference at Project site.
    1. Meet with Owner, Owner's Representative, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
    2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
    3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
    5. Review structural loading limitations of roof deck during and after roofing.
    6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

#### 1.10 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

#### 1.11 WARRANTY

- A. **Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.**
  1. **Special warranty includes membrane roofing, base flashings, EPDM high-wall flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of membrane roofing system.**
  2. **Warranty Period: 20-year No-Dollar-Limit (NDL) weathertightness warranty from date of Substantial Completion.**



- B. Special Project Warranty: Submit roofing Installer's warranty signed by Installer, covering the Work of this Section, including all components of membrane roofing system such as membrane roofing, base flashing, EPDM high-wall flashing, roof insulation, fasteners, cover boards, substrate boards, and walkway products, for the following warranty period:**

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

## PART 2 - PRODUCTS

### 2.1 SBS-MODIFIED ASPHALT-SHEET MATERIALS

- A. SBS-Modified Bituminous Membrane Roofing:

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

- a. Firestone Building Products.
- b. GAF Materials Corporation.
- c. Johns Manville.
- d. Siplast, Inc.
- e. Soprema.
- f. TAMKO Building Products, Inc.

- B. Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.

### 2.2 BASE-SHEET MATERIALS

- A. Base Sheet: ASTM D 4601, Type II, SBS-modified, asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.

1. Weight: 60 lb/100 sq. ft., minimum.

### 2.3 BASE FLASHING SHEET MATERIALS

- A. Granule-Surfaced Flashing Sheet: ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers); granular surfaced; suitable for application method specified, and as follows:

1. Granule Color: White.

## 2.4 APPROVED ROOF SYSTEM

### A. Siplast – System: (#20EG30 H)

1. Base: Paradiene 20
2. Cap: Paradiene 30 FR
3. Johns Manville
4. Base: Dyna Base
5. Cap: Dyna Glas FR.
6. Soprema:
7. Base: Elastophene HB (sanded)
8. Cap: Elastophene HP FR granular cap sheet.
9. Tamko:
10. Base: Versa Base
11. Cap: AWA Prem FR
12. GAF Materials Corporation:
13. Base: Ruberoid 20
14. Cap: Ruberoid MOP 170 FR
15. Firestone:
16. Base: SBS Base Sheet
17. Cap: SBS Glass FR
18. No substitutions allowed, use only one of the systems named above.

## 2.5 AUXILIARY ROOFING MEMBRANE MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
  1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Asphalt Primer: ASTM D 41
- C. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by roofing system manufacturer for application.
- D. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
- E. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
- F. Metal Flashing Sheet: As specified in Section 076200 "Sheet Metal Flashing and Trim."

- G. ROOF INSULATIONBGeneral: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation.
- H. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class I, Grade 3, felt or glass-fiber mat facer on both major surfaces.
- I. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/8 inch per 12 inches unless otherwise indicated.
- J. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- K. All rooftop equipment to have cricket installed on high-side to direct water to drain.
- L. Cover Board: ASTM C 208, Type II, Grade 2, cellulose-fiber insulation board, 1/2-inch thick per roofing system manufacturer recommended per roof system application.

## 2.6 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
- B. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- C. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one-component or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- D. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
- E. Insulation Cant Strips: ASTM C 728, perlite insulation board.
- F. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- G. Wood Nailer Strips: Comply with requirements in Section 061000 "Rough Carpentry."
- H. Substrate Joint Tape: 6- or 8-inch- wide, coated, glass-fiber joint tape.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
  - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
  - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

### 3.3 INSULATION INSTALLATION

- A. Comply with roofing system manufacturer's written instructions for installing roof insulation.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or more, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Adhered Insulation: Install first layer of insulation to deck using urethane adhesive specifically recommended for attaching roof insulation to deck type. "Tectum. Gypsum, and Concrete Plank Decking." (General Contractor shall verify type of decking during the bidding phase of the project.)
  - 1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Set each subsequent layer of insulation with urethane adhesive as specified by manufacturer.
- H. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type. "Metal Decking" (General Contractor shall verify type of decking during the bidding phase of the project.)
  - 1. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus 25 deg F of equiviscous temperature.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of 6 inches in each direction from joints of insulation below. Loosely butt cover boards together. Tape joints if required by roofing system manufacturer.
  - 1. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
  - 3. Apply urethane adhesive to underside, and immediately bond cover board to substrate.

#### 3.4 ROOFING MEMBRANE INSTALLATION, GENERAL

- A. Install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
  - 1. Deck Type: I (insulated).
  - 2. Adhering Method: M (mopped).
  - 3. Number of SBS-Modified Asphalt Sheets: Two.

- B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
- C. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
- D. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
  - 1. At end of each day's work, provide tie-offs to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
  - 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
  - 3. Remove and discard temporary seals before beginning work on adjoining roofing.
- E. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within 25 deg F of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
- F. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

### 3.5 BASE-SHEET INSTALLATION

- A. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
  - 1. Adhere to substrate in a solid mopping of hot roofing asphalt.

### 3.6 SBS-MODIFIED BITUMINOUS MEMBRANE INSTALLATION

- A. Install modified bituminous roofing membrane cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
  - 1. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F.
  - 2. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.

- B. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids. Laps to run in direction of water flow. Water shall not run into lap seam.
  - 1. Repair tears and voids in laps and lapped seams not completely sealed.
  - 2. Apply roofing granules to cover exuded bead at laps while bead is hot.
- C. Install roofing membrane sheets so side and end laps shed water.

### 3.7 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
  - 1. Prime substrates with asphalt primer if required by roofing system manufacturer.
  - 2. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than 425 deg F. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
- B. Extend base flashing up walls or parapets a minimum of 8 inches above roofing membrane and 4 inches onto field of roofing membrane.
- C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
  - 1. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
- D. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.

### 3.8 FIELD QUALITY CONTROL

- A. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
  - 1. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
  - 2. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
  - 3. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.

- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
  - 1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
- C. Roofing system will be considered defective if it does not pass tests and inspections.
  - 1. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

### 3.9 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION



**SECTION 076200 - SHEET METAL FLASHING AND TRIM****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. Manufactured reglets with counterflashing.
2. Formed roof-drainage sheet metal fabrications.
3. Formed low-slope roof sheet metal fabrications.
4. Formed equipment support flashing.

**B. Related Requirements:**

1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

**1.3 COORDINATION**

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

**1.4 PREINSTALLATION MEETINGS****A. Preinstallation Conference: Conduct conference at Project site.**

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

## 1.5 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

### B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

### C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

### D. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.
4. Anodized Aluminum Samples: Samples to show full range to be expected for each color required.

## 1.6 INFORMATIONAL SUBMITTALS

### A. Qualification Data: For fabricator.

### B. Sample Warranty: For special warranty.

## 1.7 CLOSEOUT SUBMITTALS

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

## 1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

- 1. For copings and roof edge flashings that are SPRI ES-1 tested , shop shall be listed as able to fabricate required details as tested and approved.

## 1.9 DELIVERY, STORAGE, AND HANDLING

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

## 1.10 WARRANTY

- A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

- 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Sheet Metal Standard for Copper: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

### 2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
- C. Metallic-Coated Steel Sheet: Provide aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 ; prepainted by coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Surface: Smooth, flat.
  - 2. 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. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 3. Color: As selected by Architect from manufacturer's full range.

## 2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as 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. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
    - 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 Copper Sheet: Copper, hardware bronze or passivated Series 300 stainless steel.
  - 3. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- 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. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.
- G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

## 2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
1. Manufacturers: Subject to compliance with requirements, provide products by the following or equal:
    - a. Fry Reglet Corporation.
    - b. Heckmann Building Products, Inc.
    - c. Hickman Company, W. P.
    - d. Sandell Manufacturing Co., Inc.
  2. Material: Stainless steel, 0.019 inch thick Copper, 16 oz./sq. ft. Aluminum, 0.024 inch thick Galvanized steel, 0.022 inch thick.
  3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  4. Accessories:
    - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
    - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.
  5. Finish: Mill With manufacturer's standard color coating.

## 2.6 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  2. Obtain field measurements for accurate fit before shop fabrication.
  3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
  4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
  - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
  - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- I. Do not use graphite pencils to mark metal surfaces.

## 2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, fasten and seal solder or weld watertight. Shop fabricate interior and exterior corners.
  - 1. Joint Style: Butted with expansion space and 12-inch- wide, concealed backup plate.
  - 2. Fabricate from the Following Materials:
    - a. Aluminum-Zinc Alloy-Coated Steel: 0.040 inch thick.
- B. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
  - 1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

C. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

D. Flashing Receivers: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:

1. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

## 2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Equipment Support Flashing: Fabricate from the following materials:

## 2.9 Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick. ROOF DRAINAGE SHEET METAL FABRICATIONS

A. Downspouts: Fabricate rectangular downspouts complete with mitered elbow. Furnish with metal hangers, from same material as downspouts and anchors.

1. Fabricated Hanger Style: SMACNA figure destination 1-35C.

2. Fabricate from the following materials:

a. Zinc-coated (galvanized) steel sheet: 0.024 inch thick.

b. Color: color as chosen from manufacturers full range of colors by Owner/Architect.

B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inches beyond cant or tapered strip into field of roof.

1. Fabricate from the following materials:

a. Zinc-coated(galvanized) steel sheet: 0.032 inch thick.

C. Splash Pans: Fabricate from the following materials:

1. Zinc-coated (galvanized) steel sheet: 0.040 inch thick.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
  - 1. Verify compliance with requirements for installation tolerances of substrates.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
  - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches.

### 3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, 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, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  - 3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
  - 5. Torch cutting of sheet metal flashing and trim is not permitted.
  - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
  2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

### 3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

### 3.5 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.
  - C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.
  - D. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
    - 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
    - 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.
  - E. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.
  - F. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
  - G. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches. Secure in waterproof manner by means of anchor and washer at 36-inch centers unless otherwise indicated.
  - H. 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.
- 3.6 MISCELLANEOUS FLASHING INSTALLATION
- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- 3.7 ERECTION TOLERANCES
- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

### 3.8 CLEANING AND PROTECTION

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

END OF SECTION

**SECTION 077200 - ROOF ACCESSORIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY****A. Section Includes:**

1. Roof curbs.
2. Roof hatches.

**B. Related Sections:**

1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 055213 "Pipe and Tube Railings" for safety railing systems not attached to roof-hatch curbs.
3. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.

**1.3 COORDINATION**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of roof accessory.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
  - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
  - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
  - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

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

### 2.2 ROOF CURBS

- A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.
  - 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. AES Industries, Inc.
    - b. Conn-Fab Sales, Inc.
    - c. Curbs Plus, Inc.
    - d. Custom Solution Roof and Metal Products.
    - e. Greenheck Fan Corporation.
    - f. Metallic Products Corp.
    - g. Roof Curb Systems Inc.
- B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
- C. Construction:
  - 1. Curb Profile: Manufacturer's standard compatible with roofing system.
  - 2. On ribbed or fluted metal roofs, form deck-mounting flange at perimeter bottom to conform to roof profile.
  - 3. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
  - 4. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.

## 2.3 ROOF HATCH

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, integral metal cant, and integrally formed deck-mounting flange at perimeter bottom.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, but not limited to :
    - a. Bilco Company (The).
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Milcor; Commercial Products Group of Hart & Cooley, Inc.
- B. Type and Size: Single-leaf lid, 30 by 54 inches.
- C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
- D. Construction:
1. Insulation:
    - a. R-Value: 12.0 according to ASTM C 1363.
  2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
  3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
  4. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
- E. Hardware: Spring operators, hold-open arm, galvanized-steel spring latch with turn handles, galvanized-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

## 2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- C. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.



- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
  - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
  - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
  - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.

C. Roof Curb Installation: Install each roof curb so top surface is level.

D. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.

### 3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 099113 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

**SECTION 079200 - JOINT SEALANTS****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. Urethane joint sealants.
  - 2. Latex joint sealants.

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified testing agency.
- B. Sample Warranties: For special warranties.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

## 1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
  - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  - 2. Conduct field tests for each kind of sealant and joint substrate.
  - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
  - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
    - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
      - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  - 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
  - 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

## 1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:

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

## 1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 JOINT SEALANTS, GENERAL

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

## 2.2 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Construction Chemicals - Building Systems; Sonalastic TX1.
    - b. Bostik, Inc.; Chem-Calk 900.
    - c. Tremco Incorporated; Dymonic.

## 2.3 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Construction Chemicals - Building Systems; Sonolac.
    - b. Bostik, Inc.; Chem-Calk 600.
    - c. Pecora Corporation; AC-20.
    - d. Tremco Incorporated; Tremflex 834.

## 2.4 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type O (open-cell material), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.5 MISCELLANEOUS MATERIALS

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

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
    - c. Unglazed surfaces of ceramic tile.
    - d. Exterior insulation and finish systems.
  - 3. Remove laitance and form-release agents from concrete.
  - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.

- c. Porcelain enamel.
  - d. Glazed surfaces of ceramic tile.
- 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.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
- 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.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. 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.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of 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.
4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.
  - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

### 3.4 FIELD QUALITY CONTROL

#### A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:
  - a. Perform 10 tests for the first 1000 feet of joint length for each kind of sealant and joint substrate.
  - b. Perform one test for each 1000 feet of joint length thereafter or one test per each floor per elevation.
2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
  - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
3. Inspect tested joints and report on the following:
  - a. Whether sealants filled joint cavities and are free of voids.
  - b. Whether sealant dimensions and configurations comply with specified requirements.
  - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.
4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

- 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.

### 3.5 CLEANING

- A. 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.

### 3.6 PROTECTION

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

### 3.7 JOINT-SEALANT SCHEDULE

- A. 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 in exterior insulation and finish systems.
    - g. Joints between metal panels.
    - h. Joints between different materials listed above.
    - i. Perimeter joints between materials listed above and frames of doors windows.
    - j. Control and expansion joints in ceilings and other overhead surfaces.
    - k. Other joints as indicated on Drawings.
  - 2. Joint Sealant: Urethane, Single component, nonsag, Class 25.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:
  - a. Control joints on exposed interior surfaces of exterior walls.
  - b. Perimeter joints of exterior openings where indicated.
  - c. Vertical joints on exposed surfaces of interior unit masonry walls.
  - d. Perimeter joints between interior wall surfaces and frames of interior doors windows.
  - e. Other joints as indicated on Drawings.
2. Joint Sealant: Acrylic latex or siliconized latex.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
4. Fire rated sealant equal to 3M at all penetrations in fire rated assemblies.

END OF SECTION



**SECTION 081113 - HOLLOW METAL DOORS AND FRAMES****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 hollow-metal work.
- B. Related Requirements:
  - 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

**1.3 DEFINITIONS**

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

**1.4 COORDINATION**

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

**1.5 PREINSTALLATION MEETINGS**

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

**1.6 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door type.

2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
  3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
  4. Locations of reinforcement and preparations for hardware.
  5. Details of each different wall opening condition.
  6. Details of anchorages, joints, field splices, and connections.
  7. Details of accessories.
  8. Details of moldings, removable stops, and glazing.
  9. Details of conduit and preparations for power, signal, and control systems.
- C. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
  1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ceco Door; ASSA ABLOY.
  2. Curries Company; ASSA ABLOY.
  3. Steelcraft; an Ingersoll-Rand company.

- B. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

## 2.2 REGULATORY REQUIREMENTS

- A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

## 2.3 INTERIOR DOORS AND FRAMES

- A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Standard-Duty Doors and Frames: SDI A250.8, Level 1. At locations indicated in the Door and Frame Schedule and interior locations unless otherwise indicated.

1. Physical Performance: Level C according to SDI A250.4.
2. Doors:
  - a. Type: As indicated in the Door and Frame Schedule.
  - b. Thickness: 1-3/4 inches 1-3/8 inches.
  - c. Face: Uncoated, Metallic-coated, cold-rolled steel sheet, minimum thickness of 0.032 inch.
  - d. Edge Construction: Model 1, Full Flush Model 2, Seamless.
  - e. Core: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core at manufacturer's discretion.
3. Frames:
  - a. Materials: Uncoated, cold-rolled steel sheet, minimum thickness of 0.042 inch.
  - b. Construction: Full profile welded.
4. Exposed Finish: Prime.

## 2.4 FRAME ANCHORS

- A. Jamb Anchors:
  1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

## 2.5 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.
- C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
  1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.
- F. Glazing: Comply with requirements in Section 088000 "Glazing."
- G. Bituminous Coating: Cold-applied asphalt mastic, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.6 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
  1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  3. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 16 inches from top and bottom of frame. Space anchors not more than 32 inches o.c., to match coursing, and as follows:



- 1) Two anchors per jamb up to 60 inches high.
  - 2) Three anchors per jamb from 60 to 90 inches high.
  - 3) Four anchors per jamb from 90 to 120 inches high.
  - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 120 inches high.
- b. Stud-Wall Type: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
- 1) Three anchors per jamb up to 60 inches high.
  - 2) Four anchors per jamb from 60 to 90 inches high.
  - 3) Five anchors per jamb from 90 to 96 inches high.
  - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof above 96 inches high.
4. Head Anchors: Two anchors per head for frames more than 42 inches wide and mounted in metal-stud partitions.
5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
- a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
  - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Fabricate concealed stiffeners and edge channels from either cold- or hot-rolled steel sheet.
- D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
  2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.
- E. Stops and Moldings: Provide stops and moldings around glazed lites and louvers where indicated. Form corners of stops and moldings with butted 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 glazing and installation types indicated.

## 2.7 STEEL FINISHES

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

## 2.8 ACCESSORIES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

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

### 3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

- B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.
1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.
  2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.
  3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
  4. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
  5. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Glazing: Comply with installation requirements in Section 088000 "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 o.c. and not more than 2 inches o.c. from each corner.

### 3.4 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. Remove grout and other bonding material from hollow-metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION

**SECTION 081416 - FLUSH WOOD DOORS****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. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

**B. Related Requirements:**

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of door. Include details of core and edge construction and trim for openings. 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; and the following:

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

- C. Samples for Initial Selection: For factory-finished doors.

- D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

2. Frames for light openings, 6 inches long, for each material, type, and finish required.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

#### 1.6 FIELD CONDITIONS

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

#### 1.7 WARRANTY

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

### 2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards."
1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
- B. Adhesives: Do not use adhesives that contain urea formaldehyde.
- C. Composite Wood Products: Products shall be made without urea formaldehyde.
- D. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252.
1. Cores: Provide mineral core as needed to provide fire-protection rating indicated.
  2. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
  3. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
- F. Structural-Composite-Lumber-Core Doors:
1. Structural Composite Lumber: WDMA I.S.10.
    - a. Screw Withdrawal, Face: 700 lbf.
    - b. Screw Withdrawal, Edge: 400 lbf.
- G. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as follows:
  - a. 5-inch top-rail blocking.
  - b. 5-inch bottom-rail blocking, in doors indicated to have protection plates.
  - c. 5-inch midrail blocking, in doors indicated to have armor plates.
  - d. 4-1/2-by-10-inch lock blocks and 5-inch midrail blocking, in doors indicated to have exit devices.
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.
  - a. Screw-Holding Capability: 475 lbf per WDMA T.M.-10.

## 2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

### A. Interior Solid-Core Doors:

1. Grade: Premium, with Grade AA faces.
2. Species: White Birch.
3. Match between Veneer Leaves: Book match.
4. Assembly of Veneer Leaves on Door Faces: Balance match.
5. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
6. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
7. Exposed Vertical and Top Edges: Same species as faces - edge Type A.
8. Core: Structural composite lumber.
9. Construction: Five plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. Faces are bonded to core using a hot press.

## 2.4 LIGHT FRAMES

### A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Flush rectangular beads.

### B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch-thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.



## 2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
  - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
  - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
  - 3. Factory Pre-Drilled Pilot Holes: Pre-drill pilot holes for hinge screws at factory to eliminate splitting of stiles.
- C. Openings: Factory cut and trim openings through doors.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."

## 2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
  - 3. Staining: As selected from manufacturer's full range.
  - 4. Sheen: Satin.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
  - 1. Install fire-rated doors according to NFPA 80.
  - 2. Install smoke- and draft-control doors according to NFPA 105.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

### 3.3 ADJUSTING

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

END OF SECTION

**SECTION 083323 - OVERHEAD COILING DOORS****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. Service doors.

- B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type and size of overhead coiling door and accessory.

- 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
  - 2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
  - 3. Include description of automatic closing device and testing and resetting instructions.

- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

- 1. Include plans, elevations, sections, and mounting details.
  - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
  - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
  - 5. Show locations of controls, locking devices, detectors or replaceable fusible links, and other accessories.
  - 6. Include diagrams for power, signal, and control wiring.

- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

- 1. Include similar Samples of accessories involving color selection.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
  - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- B. Sound-Control Doors: Assemblies tested in a laboratory for sound-transmission-loss performance according to ASTM E 90, calculated according to ASTM E 413, and rated for not less than the STC value indicated.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.
  - 1. Obtain operators and controls from overhead coiling door manufacturer.

## 2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
1. Design Wind Load: As indicated on Drawings.
  2. Testing: According to ASTM E 330
  3. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
  4. Operability under Wind Load: Design overhead coiling doors to remain operable under uniform pressure (velocity pressure) of 20 lbf/sq. ft. wind load, acting inward and outward.

## 2.3 DOOR ASSEMBLY

- A. Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Overhead Door Corporation.
    - b. Raynor.
    - c. Wayne-Dalton Corp.
    - d. or approved equal
- B. Operation Cycles: Door components and operators capable of operating for not less than 20,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
1. Include tamperproof cycle counter.
- C. Air Infiltration: Maximum rate of 0.08 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E 283.
- D. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions and finished.
- E. **Hood:** Galvanized steel.
1. Shape: As shown on Drawings.
  2. Mounting: As shown on Drawings.
- F. Locking Devices: Equip door with slide bolt for padlock.
- G. Manual Door Operator: Push-up operation.
1. Provide operator with through-wall shaft operation.

2. Provide operator with manufacturer's standard removable operating arm.

H. Door Finish:

1. **Factory Prime Finish: Manufacturer's standard color.**

## 2.4 MATERIALS, GENERAL

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.5 HOODS

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
1. Galvanized Steel: Nominal 0.028-inch- thick, hot-dip galvanized steel sheet with G90 zinc coating, complying with ASTM A 653/A 653M.
  2. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
  3. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

## 2.6 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: Cylinders specified in Section 087100 "Door Hardware" .
  2. Keys: Three **for each cylinder.**
- C. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

## 2.7 COUNTERBALANCING MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
  - 1. Fire-Rated Doors: Equip with auxiliary counterbalance spring and prevent tension release from main counterbalance spring when automatic closing device operates.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

## 2.8 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.
- B. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed [25 lbf]

## 2.9 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.10 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, controls, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

### 3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
  - 1. Adjust exterior doors and components to be weather-resistant.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.



### 3.4 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-door Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, seven-day-per-week, emergency callback service.

END OF SECTION



**SECTION 084113 - 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 and interior storefront framing.
  - 2. Storefront framing for punched openings.
  - 3. Exterior and interior manual-swing entrance doors and door-frame units.

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

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.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.

C. Source quality-control reports.

D. Field quality-control reports.

E. Sample Warranties: For special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

#### 1.7 QUALITY ASSURANCE

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

B. Laboratory Mockup Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated ..

C. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated .

#### 1.8 MOCKUPS

A. Mockups: Build mockups per 01 43 39 Mock-Ups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.

## 1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts 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 created by wind and thermal and structural movements.
- c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- d. Water penetration through fixed glazing and framing areas.
- e. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
- b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
- c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

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

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding  $1/175$  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, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to  $1/360$  of clear span or  $1/8$  inch, whichever is smaller.
  3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than  $1/240$  of clear span plus  $1/4$  inch for spans greater than 11 feet 8- $1/4$  inches or  $1/175$  times span, for spans less than 11 feet 8- $1/4$  inches.
- E. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:

- a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
  - G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
    1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..
  - H. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
    1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. .
    2. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
  - I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
    1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
    2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
      - b. Low Exterior Ambient-Air Temperature: 0 deg F.
      - c. Interior Ambient-Air Temperature: 75 deg F.
- 2.2 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. EFCO Corporation.
    2. Kawneer North America.

3. TRACO.
4. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

- B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels and accessories, from single manufacturer.

### 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads. Equal to Kawneer 451.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Finish: Clear anodic finish.
4. Fabrication Method: Field-fabricated stick system.

- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

- D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - a. Sheet and Plate: ASTM B 209.
  - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
  - d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
  - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
  - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
  - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.



## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
  - 1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch- 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 Wide stile; 5-inch nominal width.
  - 3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

## 2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Coordinate with hardware specified in Section is specified in Section 087100 "Door Hardware."
- B. 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 equivalent in function and comparable in quality to named products.
  - 2. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbfto set the door in motion and not more than 15 lbf to open the door to its minimum required width.
- C. 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.
- D. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
- E. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
- F. 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.

- G. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- H. Operating Trim: BHMA A156.6.
- I. 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 comply with field conditions and requirements for opening force.
- J. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- K. Weather Stripping: Manufacturer's standard replaceable components.
  - 1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
- L. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- M. Silencers: BHMA A156.16, Grade 1.
- N. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

## 2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."

## 2.7 ACCESSORIES

- A. 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.
- B. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- C. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. 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. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
  - 6. 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. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
- E. Storefront Framing: Fabricate components for assembly using screw-spline system.
- F. 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.
- G. 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.
- H. 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.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## 2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, 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 and to prevent impeding movement of moving joints.
  - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.

- E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
- F. Install glazing as specified in Section 088000 "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.

### 3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
    - a. Perform a minimum of three tests in areas as directed by Architect.
    - b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 10, 35, and 70 percent completion.

- C. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
  - 1. Test a minimum of four areas on each building facade.
  - 2. Repair installation areas damaged by testing.
- D. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION

**SECTION 087100 - DOOR HARDWARE****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

- 1. Mechanical door hardware for the following:
  - a. Swinging doors.
- 2. Cylinders for door hardware specified in other Sections.
  - a. Section 083323-Overhead Coiling Doors.
  - b. Section 081416- Flush Wood Doors
  - c. Section 084413- Aluminum Framed Enterances and Storefronts

**1.3 COORDINATION**

- A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.
  - 1. Cast anchoring inserts into concrete.
- B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

**1.4 PREINSTALLATION MEETINGS**

- A. Pre-installation Conference: Conduct conference at Project site.
  - 1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.

- B. Keying Conference: Conduct conference at Project site.
  - 1. Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant.
  - 2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:
    - a. Flow of traffic and degree of security required.
    - b. Preliminary key system schematic diagram.
    - c. Requirements for key control system.
    - d. Requirements for access control.
    - e. Address for delivery of keys.
    - f. Contractor shall conduct Keying Conference prior to submitting Hardware Shop Drawings.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For electrified door hardware.
  - 1. Include diagrams for power, signal, and control wiring.
  - 2. Include details of interface of electrified door hardware and building safety and security systems.
- C. Samples: For each exposed product in each finish specified, in manufacturer's standard size.
  - 1. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- D. Samples for Initial Selection: For each type of exposed finish.
- E. Samples for Verification: For each type of exposed product, in each finish specified.
  - 1. Sample Size: Full-size units or minimum 2-by-4-inch Samples for sheet and 4-inch long Samples for other products.
    - a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.



2. Tag Samples with full product description to coordinate Samples with door hardware schedule.
- F. Door Hardware Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant. Coordinate door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
1. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
  2. Format: Use same scheduling sequence and format and use same door numbers as in door hardware schedule in the Contract Documents.
  3. Content: Include the following information:
    - a. Identification number, location, hand, fire rating, size, and material of each door and frame.
    - b. Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
    - c. Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
    - d. Description of electrified door hardware sequences of operation and interfaces with other building control systems.
    - e. Fastenings and other installation information.
    - f. Explanation of abbreviations, symbols, and designations contained in door hardware schedule.
    - g. Mounting locations for door hardware.
    - h. List of related door devices specified in other Sections for each door and frame.
- G. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.
- 1.6 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer and Architectural Hardware Consultant.
  - B. Product Certificates: For each type of electrified door hardware.
    1. Certify that door hardware for use on each type and size of labeled fire-rated doors complies with listed fire-rated door assemblies.
  - C. Product Test Reports: For compliance with accessibility requirements, for tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

- D. Sample Warranty: For special warranty.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals.
- B. Schedules: Final door hardware and keying schedule.

#### 1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Door Hardware: Insert detailed descriptions and specific numbers of units.

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and of an Architectural Hardware Consultant who is available during the course of the Work to consult Contractor, Architect, and Owner about door hardware and keying.
  - 1. Warehousing Facilities: In Project's vicinity.
  - 2. Scheduling Responsibility: Preparation of door hardware and keying schedule.
- B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as an Architectural Hardware Consultant (AHC).

#### 1.10 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- D. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of doors and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  2. Warranty Period: Five years from date of Substantial Completion unless otherwise indicated below:
    - a. Mortise Locks: Three years from date of Substantial Completion.
    - b. Exit Devices: Three years from date of Substantial Completion.
    - c. Manual Closers: 10 years from date of Substantial Completion.
    - d. All other Items” 1 year from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of door hardware from single manufacturer.
1. 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.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
- B. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
2. Comply with the following maximum opening-force requirements:
  - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
  - b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

## 2.3 SCHEDULED DOOR HARDWARE

- A. Provide products for each door that comply with requirements
  1. Door hardware is to be scheduled by door hardware supplier.

## 2.4 HINGES

- A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule – IVES** or comparable product by one of the following:
    - a. McKinney Products Company; an ASSA ABLOY Group company.
    - b. Stanley Commercial Hardware; a division of Stanley Security Solutions.

## 2.5 MECHANICAL LOCKS AND LATCHES

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

## D. Lock Trim:

1. Description: As indicated on Drawings
2. Levers: Forged or Cast.
  - a. Schlage 17A design.
3. Escutcheons (Roses): Wrought, Forged or Cast. Schlage "A" roses.
4. Dummy Trim: Match lever lock trim and escutcheons.

## E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latch bolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

## F. Cylindrical Locks: BHMA A156.13; Operational Grade 1, Security grade 2, equal to Schlage L9000 series.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule, Schlage L9000 series** or comparable product by one of the following:
  - a. Corbin RusswinML2000 Series

## 2.6 AUXILIARY LOCKS

## A. Mortise Auxiliary Locks: BHMA A156.36; Grade 1 Grade 2; with strike that suits frame.

1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule, Schlage L400 series** or comparable product by one of the following:
  - a. Corbin Russwin; ASSA ABLOY.

## 2.7 MANUAL FLUSH BOLTS

## A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch throw; designed for mortising into door edge.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule or comparable product by one of the following:

- a. Burns Manufacturing Incorporated.
- b. Don-Jo Mfg., Inc.
- c. Door Controls International, Inc.
- d. IVES Hardware; an Ingersoll-Rand company.
- e. Trimco.

## 2.8 EXIT DEVICES AND AUXILIARY ITEMS

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

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule or comparable product by one of the following:
  - a. Von Duprin; an Ingersoll-Rand company.
  - b. Sargent, Assa Abloy

## 2.9 LOCK CYLINDERS

### A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.

1. Manufacturer: Same manufacturer as for locking devices.
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule and as listed below or equal:
  - a. Corbin Russwin "Pyramid" to match owner's existing Master Key System.

### B. Standard Lock Cylinders: BHMA A156.5; Grade 1.

1. Core Type: New 6 or 7-pin full face cylinder as required to match owner's existing key system.

### C. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 12 construction master keys.

### D. Construction Cores: Provide brass construction cores for construction use by general contractor.

## 2.10 KEYING

### A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, appendix. Provide one extra key blank for each lock. Incorporate decisions made in keying conference.

1. New Patented Master Key System:

- a. Master key or grand master key locks to new Corbin Russwin controlled access master key system.
- B. Keys: Nickel silver Brass.
- 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
    - a. Notation: "DO NOT DUPLICATE." Information to be furnished by Owner.
  - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
    - a. Cylinder Change Keys: Three.
    - b. Master Keys: Five.
    - c. Grand Master Keys: Five.

## 2.11 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.28; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 Insert number percent of the number of locks.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule or comparable product by one of the following:
    - a. American Key Boxes and Cabinets.
    - b. Telkee.
    - c. HPC, Inc.
    - d. Lund Equipment Co., Inc.
  - 2. Wall-Mounted Cabinet: Grade 1 cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

## 2.12 OPERATING TRIM

- A. Operating Trim: BHMA A156.6; aluminum brass bronze stainless steel unless otherwise indicated.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule or comparable product by one of the following:
    - a. Forms+Surfaces.
    - b. Ives.
    - c. Trimco.

## 2.13 ACCESSORIES FOR PAIRS OF DOORS

- A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
- B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
- C. Astragals: BHMA A156.22.

## 2.14 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written instructions for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule (LCN 4040XP series) or products by one of the following:
    - a. SARGENT 281 Series

## 2.15 MECHANICAL STOPS AND HOLDERS

- A. Wall- and Floor-Mounted Stops: BHMA A156.16.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule or comparable product by one of the following:
    - a. IVES Hardware; an Allegion PLC.
    - b. Stanley Commercial Hardware; Div. of The Stanley Works.
    - c. Trimco.

## 2.16 OVERHEAD STOPS AND HOLDERS

- A. Overhead Stops and Holders: BHMA A156.8.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated in door hardware schedule (Glynn Johnson 100 Series) or comparable product by one of the following:



- a. Architectural Builders Hardware Mfg., Inc.
- b. SARGENT Manufacturing Company; ASSA ABLOY.

## 2.17 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule – Zero**; or comparable product by one of the following:
    - a. National Guard Products, Inc.
    - b. Pemko Manufacturing Co.
    - c. Reese Enterprises, Inc.
- B. Maximum Air Leakage: When tested according to ASTM E 283 with tested pressure differential of 0.3-inch wg, as follows:
  - 1. Smoke-Rated Gasketing: 0.3 cfm/sq. ft. of door opening.
  - 2. Gasketing on Single Doors: 0.3 cfm/sq. ft. of door opening.
  - 3. Gasketing on Double Doors: 0.50 cfm per foot of door opening.

## 2.18 THRESHOLDS

- A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule – Zero**; or comparable product by one of the following:
    - a. National Guard Products, Inc.
    - b. Pemko Manufacturing Co.
    - c. Reese Enterprises, Inc.

## 2.19 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick aluminum brass bronze stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated in door hardware schedule - Ives** or comparable product by one of the following:
    - a. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
    - b. Trimco.

## 2.20 AUXILIARY DOOR HARDWARE

### A. Auxiliary Hardware: BHMA A156.16.

1. Basis-of-Design Product: Subject to compliance with requirements, provide IVES or comparable product by one of the following:
  - a. Rockwood Manufacturing Company; an ASSA ABLOY Group company.
  - b. Trimco.
  - c. Insert manufacturer's name.

## 2.21 FABRICATION

### A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rating labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

### B. Base Metals: Produce door hardware units of base metal indicated, 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.

### C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
2. Fire-Rated Applications:
  - a. Wood or Machine Screws: For the following:
    - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
    - 2) Strike plates to frames.
    - 3) Closers to doors and frames.
  - b. Steel Through Bolts: For the following unless door blocking is provided:
    - 1) Surface hinges to doors.

- 2) Closers to doors and frames.
  - 3) Surface-mounted exit devices.
3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
  4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

## 2.22 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

### 3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
  2. Custom Steel Doors and Frames: HMMA 831.
  3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule, but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches.
- E. Lock Cylinders: Install construction cores to secure building and areas during construction period.
1. Replace construction cores with permanent cores as directed by Owner.
  2. Furnish permanent cores to Owner for installation.
- F. Key Control System:
1. Key Control Cabinet: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
  2. Key Lock Boxes: Install where indicated or approved by Architect to provide controlled access for fire and medical emergency personnel.
  3. Key Control System Software: Set up multiple-index system based on final keying schedule.
- G. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."
- H. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
- I. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
1. Do not notch perimeter gasketing to install other surface-applied hardware.

- J. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- K. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

### 3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
  - 2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.
  - 3. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.8 DEMONSTRATION

- A. Hardware schedule

END OF SECTION

**SECTION 088000 - GLAZING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes:
  - 1. Glass for windows doors interior borrowed lites storefront framing and glazed curtain walls.
  - 2. Glazing sealants and accessories.

**1.3 DEFINITIONS**

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

**1.4 COORDINATION**

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

**1.5 PREINSTALLATION MEETINGS**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review temporary protection requirements for glazing during and after installation.

## 1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of the following products; 12 inches square.
  - 1. Coated glass.
  - 2. Laminated glass.
  - 3. Insulating glass.
- C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

## 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer manufacturers of insulating-glass units with sputter-coated, low-E coatings glass testing agency and sealant testing agency.
- B. Product Certificates: For glass.
- C. Product Test Reports: For tinted glass coated glass insulating glass and glazing sealants, for tests performed by a qualified testing agency.
  - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- D. Preconstruction adhesion and compatibility test report.
- E. Sample Warranties: For special warranties.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.



- D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
  - 1. Install glazing in mockups specified in Section 014339 Mock-ups, Section 084113 "Aluminum-Framed Entrances and Storefronts", Section 084413 "Glazed Aluminum Curtain Walls", to match glazing systems required for Project, including glazing methods.

#### 1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
  - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
  - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
  - 3. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
  - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

#### 1.10 DELIVERY, STORAGE, AND HANDLING

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

#### 1.11 FIELD CONDITIONS

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

## 1.12 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: 10 years from date of Substantial Completion.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
  2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.

3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

## 2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
  1. GANA Publications: ["Laminated Glazing Reference Manual" and ]"Glazing Manual."
  2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
  3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
  4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

## 2.4 GLASS PRODUCTS

- A. Ultraclear Float Glass: ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and solar heat gain coefficient of not less than 0.87.

- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

## 2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
2. Spacer: Manufacturer's standard spacer material and construction Aluminum with mill or clear anodic finish Aluminum with powdered metal paint finish in color selected by Architect.
3. Desiccant: Molecular sieve or silica gel, or a blend of both.

## 2.6 GLAZING SEALANTS

- A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - a. Dow Corning Corporation; 790.
  - b. GE Construction Sealants; Momentive Performance Materials Inc; SilPruf LM SCS2700.
  - c. May National Associates, Inc.; Bondaflex Sil 290.
  - d. Pecora Corporation; 890NST.
  - e. Sika Corporation; Sikasil WS-290.
  - f. Tremco Incorporated; Spectrem 1.

## 2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
  - 1. AAMA 804.3 tape, where indicated.
  - 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
  - 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
  - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

## 2.8 MISCELLANEOUS GLAZING MATERIALS

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

## 2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
  - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 GLAZING, GENERAL

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

### 3.4 TAPE GLAZING

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

### 3.5 GASKET GLAZING (DRY)

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



### 3.6 SEALANT GLAZING (WET)

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

### 3.7 CLEANING AND PROTECTION

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

### 3.8 MONOLITHIC GLASS SCHEDULE

- A. Glass Type: Clear heat-strengthened fully tempered float glass.
  - 1. Minimum Thickness: 1/4 inch.

### 3.9 INSULATING GLASS SCHEDULE

- A. Glass Type Low-E-coated, clear insulating glass.
  - 1. Overall Unit Thickness: 1 inch.
  - 2. Minimum Thickness of Each Glass Lite: 6 mm.
  - 3. Outdoor Lite: Heat-strengthened or Fully tempered float glass.

4. Interspace Content: Argon.
5. Indoor Lite: Heat-strengthened or Fully Tempered float glass.
6. Winter Nighttime U-Factor: .28 percent maximum.
7. Summer Daytime U-Factor: .26 percent maximum.
8. Visible Light Transmittance: 64 percent minimum.
9. Solar Heat Gain Coefficient: .27 percent maximum.
10. Safety glazing required.

END OF SECTION

**SECTION 092216 - NON-STRUCTURAL METAL FRAMING****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. Non-load-bearing steel framing systems for interior gypsum board assemblies.

**1.3 ACTION SUBMITTALS**

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

**1.4 INFORMATION SUBMITTALS**

- A. Evaluation Reports: For dimpled steel studs and runners firestop tracks, from ICC-ES.

**PART 2 - PRODUCTS****2.1 DESCRIPTION**

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

**2.2 FRAMING SYSTEMS**

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G60, hot-dip galvanized, unless otherwise indicated.
- B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.

1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 0.027 inch.
    - b. Depth: As indicated on Drawings.
  2. Dimpled Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness: 0.025 inch.
    - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Metal Thickness: 0.027 inch.
- E. Cold-Rolled Channel Bridging: Steel, 0.053-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings.
  2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: As indicated on Drawings.
  2. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
1. Configuration: Asymmetrical.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: 3/4 inch.
  2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch.
  3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.018 inch, and depth required to fit insulation thickness indicated.

## 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
  1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide one of the following:
  1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
  2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
  1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.3 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
  - 1. Space studs as follows:
    - a. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
    - b. Multilayer Application: 16 inches o.c. unless otherwise indicated.
    - c. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated.
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  - 5. Curved Partitions:
    - a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    - b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.
- D. Direct Furring:
  - 1. Screw to wood framing.

2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- E. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

END OF SECTION





**SECTION 092400 - CEMENT PLASTERING****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 vertical plasterwork (stucco).

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations and installation of control and expansion joints, including plans, elevations, sections, details of components, and attachments to other work.
- C. Samples: For each type of factory-prepared finish coat and for each color and texture specified.
- D. Samples for Initial Selection: For each type of factory-prepared finish coat and for each color and texture specified.
- E. Samples for Verification: For each type of factory-prepared finish coat and for each color and texture specified, 12 by 12 inches, and prepared on rigid backing.

**1.5 QUALITY ASSURANCE**

- A. Mockups: Build mockup per 01 43 39 Mock-ups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
  - 1. Build mockups for each substrate and finish texture indicated for cement plastering, including accessories.

- a. Size: 15 sq.ft. in surface area.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Store materials inside under cover, and keep them dry and protected against damage from weather, moisture, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- 1.7 FIELD CONDITIONS
- A. Comply with ASTM C 926 requirements.
  - B. Exterior Plasterwork:
    1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
    2. Apply plaster when ambient temperature is greater than 40 deg F.
    3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

## PART 2 - PRODUCTS

- 2.1 METAL LATH
- A. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet with ASTM A 653/A 653M, G60, hot-dip galvanized-zinc coating.
    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. Alabama Metal Industries Corporation; a Gibraltar Industries company.
      - b. CEMCO; California Expanded Metal Products Co.
      - c. ClarkDietrich Building Systems.
      - d. MarinoWARE.
      - e. Phillips Manufacturing Co.
    2. Diamond-Mesh Lath: Self-furring, 3.4 lb/sq. yd..

## 2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063, and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- B. Metal Accessories:
  - 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. Alabama Metal Industries Corporation; a Gibraltar Industries company.
    - b. CEMCO; California Expanded Metal Products Co.
    - c. ClarkDietrich Building Systems.
    - d. MarinoWARE.
    - e. Phillips Manufacturing Co.
  - 2. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
    - a. Smallnose cornerbead with expanded flanges; use unless otherwise indicated.
    - b. Smallnose cornerbead with perforated flanges; use on curved corners.
    - c. Smallnose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
    - d. Bullnose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.
  - 3. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
  - 4. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
  - 5. Steel Edge Casing: Fabricated from zinc-coated (galvanized) steel.

## 2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter unless otherwise indicated.
- E. Cementitious Backer Units: As recommended by backer unit manufacturer.

## 2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I.
  - 1. Color for Finish Coats: As chosen by Owner/Architect from manufacturers full range of colors.
- B. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to be selected from manufacturer's full range to match Architect's sample.
- C. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- D. Perlite Aggregate: ASTM C 35.
- E. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems formulated with colorfast mineral pigments and fine aggregates; for use over cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
  - 1. Products: Basis-of-Design - Subject to compliance with requirements, provide product comparable to: :
    - a. Sto Corp.; StoPowerwall Fine Finish.
  - 2. Color: As selected by Architect from manufacturer's full range.

## 2.5 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
  - 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
  - 1. Portland Cement Mixes:
    - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
    - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

- C. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates 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 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

### 3.3 INSTALLING METAL LATH

- A. Metal Lath: Install according to ASTM C 1063.
  - 1. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

### 3.4 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External (Outside) Corners:
  - 1. Install cornerbead at exterior locations.
- C. Control Joints: Locate as approved by Architect for visual effect and as follows:
  - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
    - a. Vertical Surfaces: 144 sq. ft..
    - b. Horizontal and Other Nonvertical Surfaces: 100 sq. ft..
  - 2. At distances between control joints of not greater than 18 feet o.c.
  - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
  - 4. Where control joints occur in surface of construction directly behind plaster.

5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

### 3.5 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
  1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces when measured by a 10-foot straightedge placed on surface.
  2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
  3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on substrates for direct application of plaster.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: For scratch and brown coats, for three-coat plasterwork with 3/4-inch total thickness, as follows:
  1. Portland cement mixes.
- D. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
- E. Concealed Exterior Plasterwork: Where plaster application is used as a base for adhered finishes, omit finish coat.

### 3.6 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

### 3.7 CLEANING AND PROTECTION

- A. Remove temporary protection and enclosure of other work after plastering is complete. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

**SECTION 092900 - GYPSUM BOARD****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY****A. Section Includes:**

1. Interior gypsum board.
2. Tile backing panels.
3. Cementitious backer board

**B. Related Requirements:**

1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
2. Section 093000 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.
3. Section 092216 "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.

**1.3 ACTION SUBMITTALS**

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

**B. Samples: For the following products:**

1. Trim Accessories: Full-size Sample in 12-inch- long length for each trim accessory indicated.
2. Stucco finish with substrate and primer on sample board minimum 18-inches square.

**1.4 QUALITY ASSURANCE**

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install mockups for the following:

- a. Install mockup for skim-coated cementitious backer board with stucco finish for shower areas.
  - b. Each level of gypsum board finish indicated for use in exposed locations.
2. Apply or install final decoration indicated on exposed surfaces for review of mockups.
  3. Simulate finished lighting conditions for review of mockups.

#### 1.5 DELIVERY, STORAGE AND HANDLING

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

#### 1.6 FIELD CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

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



## 2.2 GYPSUM BOARD, GENERAL

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

## 2.3 INTERIOR GYPSUM BOARD

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

1. CertainTeed Corp.
2. Georgia-Pacific Gypsum LLC.
3. National Gypsum Company.
4. Temple-Inland.
5. USG Corporation.

- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

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

- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

## 2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or 1325, with manufacturer's standard edges.

1. Products: Subject to compliance with requirements, provide one of the following or equal:
  - a. CertainTeed Corp.; FiberCement BackerBoard.
  - b. Custom Building Products; Wonderboard.
  - c. National Gypsum Company, Permabase Cement Board.
  - d. USG Corporation; DUROCK Cement Board.
2. Thickness (Walls): 5/8-inch.
3. Mold Resistance: ASTM D 3273, score of 10.

## 2.5 TRIM ACCESSORIES

### A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
  - a. Cornerbead.
  - b. Bullnose bead.
  - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
  - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
  - e. Expansion (control) joint.
  - f. Curved-Edge Cornerbead: With notched or flexible flanges.
3. Tear Away L Bead:
  - a. Basis of Design Product: Subject to the requirements provide Trim-Tex Tear Away L Bead or a comparable product of an approved manufacturer.
  - b. Application: Gypsum board walls to ceilings requiring independent movement.

### B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated; ASTM B 221, Alloy 6063-T5.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal.
  - a. Fry Reglet Corp.
  - b. Gordon, Inc.
  - c. Pittcon Industries.
2. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

## 2.6 JOINT TREATMENT MATERIALS

### A. General: Comply with ASTM C 475/C 475M.

### B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Tile Backing Cementitious Panels: As recommended by panel manufacturer.
3. Cementitious Ceiling Board: As recommended by panel manufacturer.

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

1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.

## 2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
  1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
  1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
  2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- D. Thermal Insulation: As specified in Section 072100 "Thermal Insulation"
- E. Vapor Retarder: As specified in Section 072100 "Thermal Insulation"

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.

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

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:

1. Type X: Vertical surfaces unless otherwise indicated.
2. Ceiling Type: Ceiling surfaces.
3. Moisture- and Mold-Resistant Type: As indicated on Drawings.
  - a. Areas Subject to Wetting, Steam or High Humidity: Install Type X mold and moisture resistant gypsum wallboard panels to produce a flat surface.

B. Single-Layer Application:

1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) except horizontally (perpendicular to framing) where required for abuse resistant wainscot application unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
  - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

### 3.4 APPLYING TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at locations indicated to receive tile.
- B. Areas Not Subject to Wetting or steam or high humidity: Install Type X gypsum wallboard panels to produce a flat surface except at showers.
- C. Areas Subject to Wetting, Steam or High Humidity: Install Type X mold and moisture resistant gypsum wallboard panels to produce a flat surface.
- D. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

### 3.5 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 as indicated on the Drawings. If not indicated, do not exceed the following spacing limitations:
  1. Walls: Not greater than 30 feet on center.

2. Ceilings (Restrained at Edges): Not greater than 30 feet in either direction, and not greater than 900 square feet in total area.
3. Ceilings (Unrestrained at Edges): Not greater than 50 feet in either direction, and not greater than 2,500 square feet in total area.
4. Review locations of all control joints not indicated on the Drawings with the Architect prior to installation.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated.
2. LC-Bead: Use at exposed panel edges.
3. U-Bead: Use where indicated.
4. Curved-Edge Cornerbead: Use at curved openings.

### 3.6 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 and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 2: Panels that are substrate for tile.
  3. Level 3: Not used.
  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 Section 099123 "Interior Painting."
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

### 3.7 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





**SECTION 093013 - CERAMIC TILING****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. Quarry tile.
- 2. Ceramic floor tile.
- 3. Tile backing panels.

**B. Related Requirements:**

- 1. Section 071326 "Self-Adhering Sheet Waterproofing" for waterproofing under thickset mortar beds.

**C. DEFINITIONS**

- D. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

E. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile." F. Module Size: Actual tile size plus joint width indicated.

- F. Face Size: Actual tile size, excluding spacer lugs.

**1.3 ACTION SUBMITTALS**

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

- B. Samples for Initial Selection: For tile, grout, and accessories involving color selection.

- C. Samples for Verification:

Full-size units of each type and composition of tile and for each color and finish required.

1. Full-size units of each type of trim and accessory for each color and finish required.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product.
- D. Product Test Reports: For tile-setting and -grouting products.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications:
  1. Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.

#### 1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
  - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
  - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
  - 1. Metal edge strips.

### 2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements unless otherwise indicated. No seconds will be allowed.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.

### 2.3 TILE PRODUCTS

- A. Ceramic Tile Type: Per Interior Materials Schedule. Sheet A901 in drawings.

Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following or equal:

American Olean; a division of Dal-Tile Corporation.  
Daltile.  
Quarry Tile Co.  
Seneca Tiles, Inc.

## 2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, Type A, in maximum lengths available to minimize end-to-end butt joints.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. C-Cure; C-Cure Board 990.
    - b. Custom Building Products; Wonderboard.
    - c. FinPan, Inc; ProTEC Concrete Backer Board][Util-A-Crete Concrete Backer Board.
    - d. Georgia-Pacific Building Products.
    - e. United States Gypsum Company; DUROCK Cement Board.
  2. Thickness: 1/2 inch.

## 2.5 SETTING MATERIALS

- A. Standard Dry-Set Mortar (Thinset): ANSI A118.1.
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:
  2. :
    - a. Boiardi Products Corporation; a QEP company.
    - b. Bonsal American, an Oldcastle company.
    - c. Bostik, Inc.
    - d. C-Cure.
    - e. Laticrete International, Inc.
    - f. MAPEI Corporation.
    - g. Southern Grouts & Mortars, Inc.
  3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.
  4. Color : Chosen by Owner/ Architect from manufacturers full range of colors.

## 2.6 GROUT MATERIALS

- A. Standard Cement Grout: ANSI A118.6.

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:
2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
  - a. Boiardi Products Corporation; a QEP company.
  - b. Bonsal American, an Oldcastle company.
  - c. Bostik, Inc.
  - d. C-Cure.
  - e. Laticrete International, Inc.
  - f. MAPEI Corporation.
  - g. Southern Grouts & Mortars, Inc.
3. Color:
  - a. Color: Chosen by Owner/ Architect from manufacturers full range of colors.

## 2.7 MISCELLANEOUS MATERIALS

- A. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

## 2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

1. Verify that concrete substrates for tile floors installed with adhesives bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
  - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
  - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
  - B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

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

### 3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Exterior tile floors.
    - b. Tile floors in wet areas.
    - c. Tile swimming pool decks.
    - d. Tile floors in laundries.
    - e. Tile floors consisting of tiles 8 by 8 inches or larger.

- f. Tile floors consisting of rib-backed tiles.
  - B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
  - C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
  - D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
  - E. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
  - F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
    - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
    - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
    - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
  - G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
    - 1. Quarry Tile: Match existing. Porcelain Tile: 1/4 inch.
  - H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
  - I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
    - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- 3.4 TILE BACKING PANEL INSTALLATION
- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use modified dry-set mortar for bonding material unless otherwise directed in manufacturer's written instructions.

### 3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

### 3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.7 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

- A. Interior Wall Installations, Wood or Metal Studs or Furring:
  - 1. Ceramic Tile Installation: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board.
    - a. Thinset Mortar: Improved modified dry-set mortar.
    - b. Grout: High-performance unsanded grout.

END OF SECTION



**SECTION 095113 - ACOUSTICAL PANEL CEILINGS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete. C. Related Requirements:
  - 1. Section 092216 "Non-Structural Metal Framing" for optional direct hung grid suspension systems for gypsum board ceilings.

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
  - 1. Acoustical Panel: Set of 6-inch- square Samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

**1.5 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Suspended ceiling components.
  - 2. Structural members to which suspension systems will be attached.
  - 3. Size and location of initial access modules for acoustical panels.

4. Items penetrating finished ceiling including the following:
  - a. Lighting fixtures.
  - b. Air outlets and inlets.
  - c. Speakers.
  - d. Sprinklers.
  - e. Access panels.
5. Perimeter moldings.

- B. Qualification Data: For testing agency.
- C. Product Test Reports: For each acoustical panel ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.
- D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES. E. Field quality-control reports.

#### 1.6 CLOSEOUT SUBMITTALS

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

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
  2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

#### 1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.9 DELIVERY, STORAGE, AND HANDLING

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

## 1.10 FIELD CONDITIONS

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

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

### 2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
  - 1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
  - 2. Suspension System: Obtain each type from single source from single manufacturer.

- B. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 35 percent.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E 795.

### 2.3 ACOUSTICAL PANELS

- A. Products: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acoustical Ceiling Panel: Match existing acoustical panel texture, color, and appearance.
    - a. Rockfon
    - b. Armstrong World Industries, Inc.
    - c. CertainTeed Corp.
    - d. Decoustics
    - e. USG Interiors, Inc.; Subsidiary of USG Corporation.
  - 2. Color: White, match existing white acoustical tile.
- B. Edge/Joint Detail: Square.
- C. Thickness: Manufacturer's standard for each panel product.
- D. Modular Size: As standard for each panel product identified by manufacturer's product designation in the Drawings.

### 2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
  - 1. High-Humidity Finish: Comply with ASTM C 635/C 635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

## 2.5 METAL SUSPENSION SYSTEM

- A. Products: Subject to compliance with requirements, provide products by one of the following and match color and finish of existing metal suspension system.

1. Rockfon
2. Armstrong World Industries, Inc
3. CertainTeed Corp.
4. Chicago Metallic Corporation.
5. USG Interiors, Inc.; Subsidiary of USG Corporation.

B. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653, not less than G30 coating designation; with prefinished 9/16-inch-wide metal caps on flanges.

1. Basis of Design Product: Rockfon 9/16" Exposed Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override type.
3. Face Design: Flat, flush.
4. Cap Material: Steel cold-rolled sheet except provide aluminum cap in areas of high humidity or steam exposure.

2.6 Cap Finish: Painted white, and match existing white suspension system caps.

## 2.7 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, match color and finish of existing:

1. Armstrong World Industries, Inc.
2. CertainTeed Corp.
3. Chicago Metallic Corporation.
4. Fry Reglet Corporation.
5. Gordon, Inc.
6. USG Interiors, Inc.; Subsidiary of USG Corporation.

- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
  - 1. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.
  - 2. For lay-in panels with reveal edge details, provide edge moldings that match profile of face of suspension grid.
  - 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

## 2.8 ACOUSTICAL SEALANT

- A. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
  - 1. Exposed and Concealed Joints: Non-sag, paintable, non-staining latex sealant.
  - 2. Concealed Joints: Nondrying, non-hardening, non-skinning, non-staining, gunnable, synthetic-rubber sealant.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post-installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
  6. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  7. Do not attach hangers to steel deck tabs.
  8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
  10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post-installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet. Miter corners accurately and connect securely.
  3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
1. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
  2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
- B. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
    - a. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lb of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lb of tension.
    - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- C. Acoustical panel ceiling hangers and anchors and fasteners will be considered defective if they do not pass tests and inspections. D. Prepare test and inspection reports.



3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION



**SECTION 096513 - RESILIENT BASE AND ACCESSORIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Resilient base.
  - 2. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.

**1.3 ACTION SUBMITTALS**

- A. Product Data: Manufacturer's color charts consisting of units or sections of units showing the full range of colors and patterns available for each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.
- D. Product Schedule: For resilient products. See Finish Schedule for all locations and designations.

**1.4 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every or fraction thereof, of each type, color, pattern, and size of resilient product installed.

**1.5 QUALITY ASSURANCE**

- A. Mockups: Provide resilient products with mockups specified in other Sections.

- B. Installer Qualifications: Engage an experienced installer to perform the work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- C. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. C. Store tiles on flat surfaces.

#### 1.7 PROJECT CONDITIONS

- A. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than .
- B. Install resilient products after other finishing operations, including painting, have been completed.

### PART 2 - PRODUCTS

#### 2.1 RESILIENT BASE (RB) 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:

Armstrong World Industries, Inc.

Flexco, Inc.

Johnsonite.

Roppe Corporation, USA.

- A. Resilient Base Standard: ASTM F 1861.
  - 1. Material Requirement: Type TP (rubber, thermoplastic).
  - 2. Manufacturing Method: Group I (solid, homogeneous).
  - 3. Style: Cove (base with toe) . C. Minimum Thickness: 0.125 inch.
- B. Height: 4 inches.

- C. Lengths: Coils in manufacturer's standard length, but not less than 40 feet.
- D. Outside Corners: Preformed.
- E. Inside Corners: Preformed.
- F. Finish: Satin.
- G. Colors and Patterns: As selected by Architect from full range of industry colors.

## 2.2 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.
- E. Close spaces to traffic during flooring installation and for time period after installation as recommended in writing by the manufacturer.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as 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.
- E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- F. Preformed Corners: Install preformed corners before installing straight pieces.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  - 1. Remove adhesive and other blemishes from exposed surfaces.
  - 2. Sweep and vacuum surfaces thoroughly.
  - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
  - 1. Apply two coat(s).
  - 2. Use commercially available product acceptable to flooring manufacturer.

3. Coordinate selection of floor polish with Owner's maintenance service. E. Cover resilient products until Substantial Completion.
- E. Do not move heavy or sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- F. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of the Project. Clean products according to manufacturer's written recommendations.
  1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer
  2. After cleaning, reapply polish to floor surfaces to restore protective floor floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

END OF SECTION





**SECTION 096519 - RESILIENT TILE FLOORING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Vinyl composition floor tile.
  - 2. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
- C. Samples: Full-size units of each color and pattern of floor tile required.
  - 1. For heat-welding bead, manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.
- D. Samples for Initial Selection: For each type of floor tile indicated.
- E. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- F. Product Schedule: For floor tile. Use same designations indicated on Drawings.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For Installer.

**1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for floor tile including resilient base and accessories.
    - a. Size: Minimum 100 sq. ft. for each type, color, and pattern in locations directed by Architect.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

## 1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.

- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 VINYL COMPOSITION FLOOR TILE (VCT)

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Armstrong World Industries, Inc.
  - 2. Mannington Mills, Inc.
  - 3. Tarkett, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.
- E. Size: 12 by 12 inches.
- F. Colors of Patterns: As selected by Architect from full range of industry colors.

### 2.2 INSTALLATION MATERIALS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
    - a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
    - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.

- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.

1. Lay tiles square with room axis or in pattern indicated.

- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).

- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.

- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.

- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.

- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

- B. Perform the following operations immediately after completing floor tile installation:

1. Remove adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
1. Apply two coat(s).
- E. Cover floor tile until Substantial Completion.

END OF SECTION

**SECTION 099113 - EXTERIOR PAINTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
  - 1. Steel.
- B. Related Requirements:
  - 1. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

**1.3 DEFINITIONS**

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

**1.4 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product. Review drawings for any selections that may be preselected.

- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
  - 3. VOC content.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    - b. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.



## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
  2. Product description (generic classification or binder type).
  3. Manufacturer's stock number and date of manufacture.
  4. Contents by volume, for pigment and vehicle constituents.
  5. Thinning instructions.
  6. Application instructions.
  7. Color name and number.
  8. VOC Content.
- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

## 1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Benjamin Moore & Co.
  2. Farrell-Calhoun.
  3. ICI Paints.
  4. PPG Architectural Finishes, Inc.
  5. Pratt & Lambert.
  6. Sherwin-Williams Company (The).

## 2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. 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.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As selected by Architect from manufacturer's full range.

## 2.3 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
  - 1. Benjamin Moore & Co: P06 SuperSpec HP Acrylic Metal Primer.
  - 2. Sherwin-Williams Company (The): B50W21 KemKromik Universal Metal Primer.
  - 3. ICI Paints: #4160 DevGuard Multipurpose Primer.

## 2.4 WATER-BASED PAINTS

- A. Light Industrial Coating, Exterior, Water Based, Semi-Gloss (Gloss Level 5): MPI #163.
  - 1. Benjamin Moore & Co: P29 DTM Acrylic Semi-Gloss.
  - 2. Sherwin-Williams Company (The): B66W351 SherCryl Semi-Gloss.
  - 3. ICI Paints: #4206 DevFlex Interior/Exterior Semi-Gloss.

## 2.5 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
  - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
  - 2. Testing agency will perform tests for compliance with product requirements.

3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- C. Proceed with coating application only after unsatisfactory conditions have been corrected.
  1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  1. SSPC-SP 3, "Power Tool Cleaning."

- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
  - 1. Use applicators and techniques suited for paint and substrate indicated.
  - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
  - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
  - 4. Paint entire exposed surface of window frames and sashes.
  - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Uninsulated metal piping.
    - b. Uninsulated plastic piping.
    - c. Pipe hangers and supports.
    - d. Metal conduit.
    - e. Plastic conduit.
    - f. Tanks that do not have factory-applied final finishes.
    - g. .

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

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

### 3.6 EXTERIOR PAINTING SCHEDULE

- A. Steel Substrates:
  - 1. Water-Based Light Industrial Coating System:
    - a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.
    - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
    - c. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.

END OF SECTION



**SECTION 099123 - INTERIOR PAINTING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
  - 1. Concrete.
  - 2. Concrete masonry units (CMU).
  - 3. Steel.
  - 4. Galvanized metal.
  - 5. Wood.
  - 6. Gypsum board.
  - 7. Cotton or canvas insulation covering.

**1.3 DEFINITIONS**

- A. Gloss Levels: In accordance with ASTM D 523.
  - 1. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees.
  - 2. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees.
  - 3. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees.
  - 4. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees.
  - 5. Gloss Level 5: 35 to 70 units at 60 degrees.
  - 6. Gloss Level 6: 70 to 85 units at 60 degrees.
  - 7. Gloss Level 7: More than 85 units at 60 degrees.
- B. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including product number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

- C. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- C. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. VOC content.

#### 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

#### 1.6 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft.
    - b. Shower ceilings.
    - c. Other Items: Architect will designate items or areas required.
  - 2. Final approval of color selections will be based on mockups.



- a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### 1.8 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis of Design Product: Subject to compliance with the requirements provide the product named in Interior Materials Legend or a comparable product from one of the following:
  1. **AkzoNobel; Glidden Professional, International Paints/Devoe Coatings. (GP)**
  2. Benjamin Moore & Co. (BM)
  3. Kelly-Moore Paints. (KM)
  4. Porter Paints. (PP)
  5. PPG Architectural Finishes, Inc. (PPG)
  6. Sherwin Williams (SW)
  7. Tnemec Co., Inc. (TN)

#### 2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
1. Flat Paints and Coatings: 0 g/L.
  2. Nonflat Paints and Coatings: 0 g/L.
  3. Industrial Maintenance Coatings: 250 g/L.
  4. Dry-Fog Coatings: 150 g/L.
  5. Primers, Sealers, and Undercoaters: 100 g/L.
  6. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 100 g/L.
  7. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
  8. Pretreatment Wash Primers: 420 g/L.
  9. Floor Coatings: 50 g/L.
  10. Shellacs Clear: 730 g/L.
  11. Shellacs, Pigmented: 550 g/L.
- C. Colors: As indicated in the Drawing A901-FINISH LEGENDS.

## 2.3 BLOCK FILLERS

- A. Interior/Exterior Latex Block Filler:
1. Basis of Design: SW-PrepRite Interior/Exterior Block Filler B25W25.
  2. Comparable product of an approved manufacturer.
- B. Masonry Epoxy Block Filler:
1. Basis of Design: SW-Kem Cati-Coat HS
  2. Comparable product of an approved manufacturer.

## 2.4 PRIMERS/SEALERS

- A. Masonry Primer
1. Basis of Design: SW-Loxon Concrete and Masonry Primer A24W300.
  2. Comparable product of an approved manufacturer.
- B. Metal Primer
1. Basis of Design: SW-Pro-Industrial Pro-Cryl Universal Waterbased Primer.
  2. Comparable product of an approved manufacturer.

## C. Quick-Drying Metal Primer

1. Basis of Design: SW- Pro-Industrial Pro-Cryl Universal Waterbased Primer.
2. Comparable product of an approved manufacturer.

## D. Galvanized Metal Primer:

1. Basis of Design: SW- Pro-Industrial Pro-Cryl Universal Waterbased Primer.
2. Comparable product of an approved manufacturer.

## E. Latex Wall Primer:

1. Basis of Design: SW- ProMar 200 Zero VOC Primer B28 Series
2. Comparable product of an approved manufacturer.

## F. Wood Primer:

1. Basis of Design: SW- Premium Wall and Wood Primer B28W8111.
2. Comparable product of an approved manufacturer.

## 2.5 LATEX PAINTS

## A. Latex Enamel:

1. Basis of Design: SW-ProMar 200 Zero VOC Latex.
2. Comparable product of an approved manufacturer.

## 2.6 WATERBASED EPOXY PAINTS

## A. 0 VOC Epoxy Coating:

1. Basis of Design: SW - Pro Industrial 0 VOC Waterbased Catalyzed Epoxy B73 Series.
2. Comparable product of an approved manufacturer.

## 2.7 ACRYLIC PAINTS

## A. Acrylic Enamel:

1. Basis of Design: SW-Pro Industrial 0 VOC Acrylic Enamel B66 Series.
2. Comparable product of an approved manufacturer.

## B. Acrylic Dry Fall:

1. Basis of Design: SW-Waterborne Acrylic Dryfall.
2. Comparable product of an approved manufacturer.

## 2.8 SOURCE QUALITY CONTROL

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Galvanized-Metal Deck Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by SSPC-SP1 to remove all soluble contamination by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
  - 1. Field Test for Contamination of Galvanized Deck Surfaces to Receive Finish Coatings:
    - a. Test shall be conducted to test for surface contamination, presence of chromate passivation or passivation film.

- b. Field test galvanized decking surfaces to receive finish coatings by using the following test method:
  - 1) Place a drop of 5% copper sulfate on the surface of galvanizing. If the copper sulfate solution, which is a clear, light blue color, changes to black instantly, the surface is considered bare with no soluble contamination. If there is any delay in color change, the surface is contaminated and shall be cleaned. Perform the test at the rate of one test per 1000sf to be painted.
  - 2. Surface Preparation by Mechanical Means: ASTM D6386, Method A, Section 5.4.2 for use with exterior exposures and interior moderate-severe exposures to produce a uniform anchor profile 1.0-2.0 mils.

J. Wood Substrates:

- 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
- 2. Sand surfaces that will be exposed to view, and dust off.
- 3. Prime edges, ends, faces, undersides, and backsides of wood.
- 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions.

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

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Refer to Divisions 21, 22, 23, and 26 for painting requirements where indicated.
  2. Paint the following work where exposed in occupied spaces. Coordinate with the Drawing Finish Legend and reflected ceiling plans:
    - a. Shop primed diffusers, grills and related HVAC accessories located in grey acoustical ceiling panel ceilings. Coordinate with Drawing Finish Legend, and reflected ceiling plans.
    - b. Ducts and related grilles and diffusers.
    - c. Equipment, including panelboards.
    - d. Uninsulated metal piping.
    - e. Uninsulated plastic piping.
    - f. Pipe hangers and supports.
    - g. Metal conduit.
    - h. Plastic conduit.
    - i. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - j. Other items as directed by Architect.
  3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- F. Identification of Fire-Rated Partitions: Provide the following identification message stenciled permanently on all fire walls, fire barriers, fire partitions, smoke barriers, smoke partitions, and any other partition required to have protected openings or penetrations as defined by the Building Code:
1. Identification Message: FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS.
  2. Font: Not less than 1/2-inch-high block (sans serif) lettering.
  3. Spacing: Locate identification message within 15 feet of end of each wall or partition and at intervals not exceeding 30 feet measured horizontally along the wall or partition.
  4. Locations: Provide message in the following accessible concealed locations:
    - a. Floor-ceiling plenum.
  5. Signage or other graphic marking that is acceptable to the Authority Having Jurisdiction, that complies with the other requirements for such identification signage listed above, and that can be permanently affixed to the wall or partition may be installed in lieu of painted stencil, at the Contractor's option.
  6. Paint: Latex enamel, as applicable for wall substrate. Refer to PART 3 "INTERIOR PAINTING SCHEDULE."

### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.5 CLEANING AND PROTECTION

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

### 3.6 INTERIOR PAINTING SCHEDULE

- A. See sheet 'A901- Finish Schedules' for interior painting schedule.

END OF SECTION



**SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:
  - 1. Public-use washroom accessories.
    - a. Grab Bars
    - b. Toilet Tissue Dispenser
    - c. Mirrors
    - d. Paper Towel Dispenser
    - e. Soap Dispenser
    - f. Sanitary Napkin Disposal
  - 2. Custodial accessories.

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include the following:
  - 1. Construction details and dimensions.
  - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
  - 3. Material and finish descriptions.
  - 4. Features that will be included for Project.
  - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
  - 1. Identify locations using room designations indicated.
  - 2. Identify products using designations indicated.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Warranty: Sample of special warranty.

### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

### 1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

### 1.7 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

## 2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Bobrick Washroom Equipment, Inc.
  2. Bradley Corporation.
  3. McKinney/Parker Washroom Accessories Corporation.
  4. Or approved equal.
- B. Toilet Tissue (Roll) Dispenser :
1. Basis-of-Design Product: Bobrick; B-2888.
  2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset .
  3. Mounting: Surface mounted.
  4. Capacity: Designed for 5-inch- diameter tissue rolls.
  5. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Paper Towel (Roll) Dispenser :
1. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
  2. Mounting: Surface mounted.
  3. Minimum Capacity: 8-inch- wide, 800-foot- long roll.
  4. Material and Finish: Stainless steel, No. 4 finish (satin).
  5. Lockset: Tumbler type.
- D. Liquid-Soap Dispenser:
1. Basis-of-Design Product: Bobrick; B-2112.
  2. Description: Designed for dispensing soap in liquid or lotion form.
  3. Mounting: Horizontally oriented, surface mounted.
  4. Capacity: 40 oz..
  5. Materials: Stainless steel, No. 4 finish (satin).
  6. Lockset: Tumbler type.
  7. Refill Indicator: Window type.
- E. Grab Bar :
1. Basis-of-Design Product: B-5806-36, B-5806-42, B-5837.
  2. Mounting: Flanges with concealed fasteners.
  3. Material: Stainless steel, 0.05 inch thick.
    - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
  4. Outside Diameter: 1-1/4 inches.
  5. Configuration and Length: As indicated on Drawings.

## F. Sanitary-Napkin Disposal Unit :

1. Basis-of-Design Product: Bobrick; B-254.
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover.
4. Material and Finish: Stainless steel, No. 4 finish (satin).

## G. Mirror Unit :

1. Basis-of-Design Product: Bobrick; B-165 2436 and B-165 2472.
2. Frame: Stainless-steel channel.
  - a. Corners: Mitered and mechanically interlocked.
  - b. Fabricate frames to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
    - 1) Provide galvanized steel backing sheet, not less than 0.34 inch
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
  - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
  - b. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
4. Size: As indicated on Drawings.

## 2.3 CUSTODIAL ACCESSORIES

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

1. Bobrick Washroom Equipment, Inc.
2. Bradley Corporation.
3. McKinney/Parker Washroom Accessories Corporation.
4. Or approved equal.

## B. Mop and Broom Holder :

1. Basis-of-Design Product: Bobrick; B-223.
2. Description: Unit with holders.
3. Length: 36 inches.
4. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

## 2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION



## SECTION 104413 - FIRE EXTINGUISHER CABINETS

### 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. Related Sections:
  - 1. Section 099113 "Exterior Painting" for field painting fire protection cabinets.
  - 2. Section 099123 "Interior Painting" for field painting fire protection cabinets.
  - 3. Section 104416 "Fire Extinguishers."

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
  - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Samples for Initial Selection: For each type of fire protection cabinet indicated.

#### 1.4 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated with wall thickness.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- B. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

## 2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire hose, rack, valve, and extinguisher.
1. Products: Subject to compliance with requirements, provide products by one of the following:
    - a. Fire End & Croker Corporation;
    - b. J. L. Industries, Inc., a division of Activar Construction Products Group;
    - c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc;
    - d. Larsen's Manufacturing Company;
    - e. Modern Metal Products, Division of Technico Inc.;
    - f. Moon-American;
    - g. Potter Roemer LLC;
    - h. Watrous Division, American Specialties, Inc.;
- B. Cabinet Construction: 1-hour fire rated.
1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- thick, cold-rolled steel sheet lined with minimum 5/8-inch- thick, fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Steel sheet.
- D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
1. Rolled-Edge Trim: 4-1/2-inch backbend depth.
- E. Cabinet Trim Material: Same material and finish as door.
- F. Door Material: Steel sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
1. Provide projecting lever handle with cam-action latch or recessed door pull and friction latch.
  2. Provide continuous hinge, of same material and finish as trim, or concealed hinge permitting door to open 180 degrees.
- J. Accessories:



1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate on drawings.
  - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
    - 1) Location: Applied to cabinet glazing.
    - 2) Application Process: Silk-screened.
    - 3) Lettering Color: Red.
    - 4) Orientation: Vertical.

K. Finishes:

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

## 2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
  1. Weld joints and grind smooth.
  2. Provide factory-drilled mounting holes.
  3. Prepare doors and frames to receive locks.
  4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
  1. Miter and weld perimeter door frames.

## 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated

#### 3.3 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

**SECTION 104416 - FIRE EXTINGUISHERS****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 portable, fire extinguishers.
- B. Related Sections:
  - 1. Section 104413 "Fire Extinguisher Cabinets."

**1.3 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Warranty: Sample of special warranty.

**1.5 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

**1.6 QUALITY ASSURANCE**

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

#### 1.7 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

#### 1.8 WARRANTY

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

1. **Failures include, but are not limited to, the following:**
  - a. **Failure of hydrostatic test according to NFPA 10.**
  - b. **Faulty operation of valves or release levers.**
2. **Warranty Period: years from date of Substantial Completion.**

#### PART 2 - PRODUCTS

- a. J. L. Industries, Inc.; a division of Activar Construction Products Group.
- b. Larsen's Manufacturing Company.
- c. Potter Roemer LLC.

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
  1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

##### 3.2 INSTALLATION

- A. General: Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.

##### 3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.

- B. Refinish or replace cabinets and doors damaged during installation
- C. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION



## SECTION 11400 - FOOD SERVICE

## PART 1 GENERAL

## 1.01 SUMMARY

- A. The extent of Food Service Equipment is indicated on the drawings and by schedules and equipment lists associated with either the drawings or this section.
- B. If during review of bid results, during the review of successful bidder (FSEC) shop drawing submittals, or at any other time post bid it is discovered that an item that is to be provided is not the model with accessories as specified or that approved prior to the acceptance of bids, the item will be rejected. The successful bidder (FSEC) shall be required to provide the model with accessories as originally specified. Adjustment to successful bidder's (FSEC's) pricing shall not be allowed. If there are more than three (3) items bid that are not considered approved according to this document the bid will be rejected in its entirety, as this will be considered intentional falsification.

## 1.02 FOOD SERVICE EQUIPMENT CONTRACTOR

- A. Food Service Equipment Contractor or abbreviation FSEC or the term Bidder means the person, company or corporation that will contract for the work specified.
- B. Murray/Corban Consultants (Food Service Design & Equipment Specification)  
**Project Consultant:** Bill Murray, P. O. Box 911,  
Vidalia, LA 71373  
Phone: 601-807-1368  
Email: [b.murray@bellsouth.net](mailto:b.murray@bellsouth.net)  
Karen Corban, 113 Cedar Hill Dr. , Oxford, MS 38655; Phone 662-236-6314. Email [k\\_corban@bellsouth.net](mailto:k_corban@bellsouth.net) , Cell phone 662-801-6314.
- C. Food Service Equipment Contractor's Work Includes:
  - 1. All labor, materials, equipment necessary for complete installation of equipment as indicated and specified.
  - 2. Delivery, unloading, storing, assembly and setting in place indicated of all equipment specified.
  - 3. Delivery of all loose fittings to other trades and coordination of same.
  - 4. Protection of all equipment from fire, theft and damage, and

coordination of same.

5. Inspection to see that all rough-ins and connections to equipment: mechanical, electrical, refrigeration, and ventilation; are made according to the intent of these specifications.
6. Mechanical Work by FSEC
  - a. Remote refrigeration lines
  - b. Furnish faucets as specified
  - c. Install wastes and overflows as specified
7. Electrical Work by FSEC
  - a. All combination starter/junction boxes where required per rules, regulations and codes where part of equipment and/or as specified, with direction for installation.
  - b. All electrically operated equipment; wiring terminating in junction boxes, combination starters and/or control panels; ready for final connections by Division 16 Electrical Contractor.
  - c. Motors less than ½ HP with manual starters, 12V, single phase.
  - d. Motors ½ HP or more, three phase with nonfusible disconnect switch and magnetic starters.
  - e. Remote start/stop station where manual operation is desired.
  - f. All starters with thermal overload protection for each phase.
  - g. Receptacles specified as part of equipment.
  - h. All required cords and plugs as specified.

#### 1.03 MECHANICAL AND ELECTRICAL

- A. Division 15 and 16 Contractors to furnish utility rough-ins for all equipment, and all materials, fittings, labor, etc. required to extend from rough-in locations and make final connections to Food Service Equipment unless otherwise specified. Refer to Divisions 15 and 16.

#### 1.04 QUALITY ASSURANCE

- A. General Standards: Except as otherwise indicated, comply with the following standards as applicable to the manufacture, fabrication and installation of the equipment and work of this section.
  1. NSF Standards: Provide NSF "Seal of Approval" on each manufactured item and on major items of custom-fabrication.
  2. UL Standards: For electrical components and assemblies provide either UL labeled products, or where no labeling service is available "Recognized Markings" to indicate listing in the UL "Recognized Component Index" or ETL.
  3. NFPA Standards: Comply with NFPA Bulletin 96, NEC Volume 5 and NEC for electrical wiring and devices.



4. National Electrical Code: Comply with NFPA Volume 5 for electrical wiring and devices included with Food Service Equipment.
- B. All fabricated assemblies or electrically operated equipment shall have Underwriter's Laboratories Approval, or UL Reexamination of Listing, or ETL in every case where such approval has been established for the type of device in question. Approval has been established when at least one type of device has been approved by UL or ETL.
- C. All manufactured items of electrically operated equipment shall have UL or ETL, or UL/ETL Reexamination listing, in every case where such approval has been established for the type of device in question. Approval has been established when at least one type of device has been approved by UL or ETL.

#### 1.05 SUBSTITUTIONS

- A. **All substitutions must be submitted through proper procedure no later than fifteen (15) days prior to bid date.** It is intended for the plan drawings and written documents to establish minimum quality and performance standards, which if met or are exceeded may qualify such equipment as an acceptable alternate source. The Architect/Consultant with approval of owner will determine if an item of equipment submitted as an alternate to those listed in the documents is an acceptable substitute. See 1.06 (A) for Submittal Instructions.

**It is the responsibility of the FSEC to verify that any and all equipment items submitted for review as alternate(s) correspond and coordinate with the project drawings and specifications. Any project cost(s) incurred for structural, mechanical or electrical alterations to accommodate variances in approved alternate equipment will be the responsibility of the FSEC supplying the equipment.**

#### 1.06 SUBMITTALS:

- A. MANUFACTURER'S DATA  
Submit manufacturer's or shop fabricator's product information (five (5) copies).

Submit installation instructions for each item of Food Service Equipment. For operating equipment include data or performance and operating characteristics, power/fuel consumption, and rough-in information. Provide maintenance manuals, operating instructions, parts lists, precautions against hazards, manufacturer's warranties and similar information. Mark each data sheet or brochure with FSEC's name and address, project name and location, and applicable project equipment item number(s). Indicate all options to be provided.

1. As part of submittal, within thirty (30) days of award of general

contract, submit an itemized listing of each item of equipment, its manufacturer, make and model. Distribute one additional copy of installation and start-up instructions to the installer.

B. SHOP DRAWINGS-Submit min. of five (5) copies:

Submit shop drawings showing layouts, elevations, sections and details of custom-fabricated work (work not shown by standard manufacturer's data sheets). Show layouts and elevations at ¼ inch scale, sections at 1- ½ inch scale, and details at 3 inch scale.

1. Submit fully dimensioned ¼ inch scale rough-in drawings showing all required plumbing, electrical and ventilation services for equipment.
2. Rough-in locations shall make allowances for required traps, valves, switches, etc. thereby not requiring interpretation or adjustment by other trades. All work to be coordinated closely with other trades.

C. SAMPLES

Submit three (3) samples of each exposed finish on shop-fabricated and field-fabricated Food Service Equipment. Submit 12 inch squares of sheet materials and 24 inch lengths of linear materials. Samples will be reviewed by Architect/Consultant for color, pattern, and texture only. Compliance with other requirements is the exclusive responsibility of the FSEC.

1.07 PRODUCT HANDLING

- A. Protect all equipment from damage during shipping, storage, handling, installation and construction of other work in same spaces. Wrap and crate each item of equipment as needed for protection from damage.
1. Cover all exposed stainless steel surfaces with self-adhesive protective paper of a type recommended by the manufacturer. Do not remove until work is installed and equipment is ready for cleaning and start-up.
  2. Equipment will not be shipped to job sites unless necessary manpower and unloading equipment are present to handle all items.

1.08 WARRANTY

- A. FSEC shall warranty all equipment furnished under this contract against defects in material and workmanship for a minimum period of one (1) year.

1. Warranty shall go into effect on date of substantial completion or date put into service by Owner, whichever is shorter.
- B. Sealed refrigeration units warranted for five (5) years.
- C. Owner is not responsible for any expense involved in servicing of any item furnished under this contract unless it can be shown that said items were misused by Owner or that said service call was unnecessary.
- D. Owner will ask only FSEC for any warranty service or repair and shall not be expected to direct any calls to any other agency.
- E. Owner shall have continued use of defective equipment until replacement is delivered.

#### 1.09 INSTRUCTIONS TO BIDDERS (SUPPLEMENTAL)

- A. Submission of a bid for this section shall constitute full evidence that FSEC has examined all documents and is fully cognizant of conditions and regulations under which this work will be performed.
- B. Owner reserves the right and option of deleting up to 25% of dollar amount of base bid by selecting items from above list submitted by FSEC.
  1. Owner has the right and option of accepting all or any portion of the foodservice equipment in the itemized price list submitted by FSEC.
  2. Owner has the right and option of purchasing any previously deleted equipment within ninety (90) days after contract is signed.
- C. Acceptable fabricators for this project, exceptions will be indicated below.
  1. Low-Temp Manufacturing, Jonesboro, GA
  2. American Foodservice Company, Savannah, TN
  3. Atlanta Custom Fabricators, Douglasville, GA
- C. **Refrigeration Systems must be supplied by the manufacturer of the approved Walk-In freezer/cooler with the exception of any alternate listed in the specification**

## PART 2 – PRODUCTS

### 2.01 METALS

- A. Stainless Steel: AISI Type 302/304, hardest workable temper. No. 4 directional polish.

1. Where painted finish is indicated, provide mill phosphatized treatment in lieu of chemical treatment.
- B. Steel Sheet: ASTM A 569 hot rolled carbon steel.
- C. Galvanized Steel Pipe: ASTM A 53 or ASTM A 120, welded or seamless, schedule 40, galvanized.
- D. Aluminum: ASTM B 209/B 221 sheet, plate and extrusions (as indicated), allow temper and finish as determined by manufacturer/fabricator, except 0.40-MIL natural anodized finish on exposed work unless another finish is indicated.

## 2.02 JOINT MATERIALS

- A. Sealants: One-part or two-part, polyurethane or silicone based, liquid elastomeric sealant, FS TT-S-00227 or FS-TT-S-00230, non-solvent release type, mildew-resistant, Shore A hardness of 30 except 45 if subject to traffic.
- B. Baker Rod: Polyethylene rod stock, larger than joint width.
- C. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride, light grey, minimum of 40 Shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

## 2.03 PAINT AND COATINGS

- A. General: Provide the types of painting and coating materials which, after drying or curing are suitable for use in conjunction with Food Service.
  1. Sound Deadening: 1/8" thick mastic, painted with aluminum paint under all tops. Mastic shall be equal to 3M-E.C. Coating #1000.
  2. Sealant: Silicone type, standard clear. Dow 732/734, General Electric, or Dupont.

## 2.04 CASTERS

- A. General: Type and size indicated or, if not indicated, as recommended by caster manufacturer for the type and weight of equipment supported, but not less than 5 inch diameter with 15/16 inch tread width. With sealed self-lubricating stainless steel ball bearings, cadmium-plated steel disc wheels and solid light-grey synthetic rubber tires, unless otherwise specified. Provide stainless steel horns and accessories. Unless otherwise specified, equip each item with 4 swivel-type casters and provide foot

brakes on two casters on opposite corners of equipment.

- B. Caster Bumpers: Unless equipment item is equipped with another form of all-around protective bumper, provide circular rotating bumper above each caster, 5 inch diameter tire of light grey synthetic rubber (hollow or closed-cell) on cadmium-plated disc.

## 2.05 PLUMBING, FITTINGS, TRIM AND ACCESSORIES

- A. General: Where exposed or semi-exposed, provide bright chrome-plated brass or polished stainless steel units. Provide copper or brass where not exposed. Drains to be copper. Copper to be painted with silver paint. All drains to be kept off floor surface.
- B. Water Outlets: At sinks and at other locations where water is supplied (by manual, automatic or remote control), provide commercial quality faucets, valve dispensers and fill devices, or the type and size indicated and as required to operate as indicated. Include manual cut-off valves and connecting stem pipes to permit outlet servicing without shut-down of water supply piping systems.
- C. Vacuum Breakers: Provide with food service equipment where required by governing regulations, including locations where water outlets are equipped for hose attachment. Fittings to comply with all codes.
- D. Waste Fittings: Except as otherwise indicated, provide 2 inch remote-lever waste valve, and 3 ½ inch strainer. Strainer without connected overflow on sinks, similar to Component Hardware, Model Series D-10-7400, or Standard Keil, Model 1755.

## 2.06 ELECTRICAL MATERIALS

- A. General: Provide standard materials, devices and components as recommended by the manufacturer/fabricator, selected and installed in accordance with NEMA Standards and recommendations, and as required for safe and efficient use and operation of the Food Service Equipment, without objectionable noise, vibration and sanitation problems.
- B. Controls and Signals: Provide recognized commercial grade signals, "on-off" push buttons or switches, and other speed and temperature controls as required for operation of each item, complete with pilot lights and permanent signs and to assist the user of each item. Provide stainless steel cover plates at controls and signals.
- C. Connections: Equip each item requiring electrical power with either a terminal box for permanent connection or cord-and-plug for interruptible connection, as indicated. Provide standard

grounded-type plugs, matching outlets (specified in Division 16) light grey cord and plug. Two or more receptacles of same voltage in same equipment, prewired to common junction box for one final connection, providing total load does not exceed 30 amps.

1. All pre-wiring done in rigid conduit.
  2. All wires color coded and tagged.
- D. Motors: Totally enclosed type, except drip-proof type where not exposed to a dust or moisture condition. Motors to have ball bearings impregnated to resist moisture, horsepower and duty-cycle ratings as required for the service indicated. Power Characteristics – Refer to Division 16 specifications for project power requirements for loads and ratings.
- E. Electrical Disconnects: Where noted furnish electrical fused disconnects for the required equipment. Disconnects to comply with all applicable codes. Installation and interwiring by Division 16.
1. Where protective covers or bottom enclosures are provided, access to the technical controls and all other devices may not be impeded. FSEC required to provide listing of specific security devices and protections for each item.

## 2.07 FABRICATION OF METAL WORK

- A. General Fabrication Requirements: Remove burrs from sheared edges of metal work, ease the corners and smooth to eliminate cutting hazard. Bend sheets of metal at not less than the minimum radius required to avoid grain-separation in the metal. Maintain flat smooth surfaces without damage to finish.
1. Reinforce metal at locations of hardware, anchorages and accessory attachments, wherever metal is less than 14 gauge or requires mortised application. Conceal reinforcements to the greatest extent possible. Weld in place on concealed faces. Where equipment weighing more than 40 pounds is located, reinforce top with stainless steel channel.
  2. Where fasteners are permitted, provide tamper-proof, flat or oval head machine screws. Cap threads with acorn nuts unless fully concealed in inaccessible construction, and provide nuts and lockwashers unless metal for tapping is at least 12 gauge. Match fastener head finish with finish or metal fastened.
  3. Where and if components of fabricated work are indicated to be galvanized, and involve welding or machining of metal

heavier than 16 gauge, complete the fabrication and provide hot-dip galvanizing of each component after fabrication. To the greatest extent possible (depending upon available dip-tank size) Comply with ASTM A 123.

4. Where vents are required for enclosed spaces, or for cabinet enclosures, provide removable stainless steel mesh insect screens. Locate vents to avoid moisture penetration during cleaning of equipment.
  5. Provide removable panels for access to mechanical and electrical service connections which are concealed behind or within Food Service Equipment, but only where access is not possible and not indicated through other work.
- B. Metal and Gauges: Except as otherwise indicated, fabricate exposed metal work of stainless steel, and fabricate the following components from the gauge of metal indicated, and other components from not less than 20 gauge metal.
- |   |                        |
|---|------------------------|
| 1. Table Tops                           | 14 gauge               |
| 2. Counter Tops                         | 14 gauge               |
| 3. Walls and Undershelves               | 16 gauge               |
| 4. Enclosed Wall Cabinets               | 18 gauge               |
| 5. Sinks and Drainboards                | 14 gauge               |
| 6. Removable Covers, Panels             | 18 gauge               |
| 7. Skirts and Enclosure Panels          | 18 gauge               |
| 8. Closure and Trim Strips over 4" wide | 18 gauge               |
| 9. Hardware Reinforcement               | 12 gauge               |
| 10. Gusset Plates                       | 10 gauge               |
| 11. Legs and Crossrails                 | 16 gauge (1 5/8" dia.) |
- C. Work Surface Fabrication: Fabricate metal work-surfaces by forming and welding to provide seamless construction, using welding rods matching sheet metal, grinding and polishing. Where necessary for disassembly provide waterproof gasketed draw-type joints with concealed bolting, or provide continuous welding. Refer to itemization for directions.
1. Reinforce work-surfaces 30 inches O. C. both ways with stainless concealed structural members. Reinforce edges which are not self-reinforced by formed edges.
  2. Sound deaden underside of all metal work-surfaces, including sink and similar units, with a coating of sound deadening material. Hold coating back 3 inches from sanitary edges which are open for cleaning.
- D. Enclosures, General: Provide enclosures, including panels, housing, and skirts for service lines and mechanical and electrical devices, and secondary enclosures for equipment items, where

indicated and where required for compliance with governing regulations and NSF Standards. Otherwise, fabricate each item to be as open as possible, for ease of cleaning.

1. Where equipment is exposed to customer view, provide enclosure of service lines, operating components and mechanical and electrical devices.
- E. Shop Painting: Clean and prepare metal surfaces to be painted, remove rust and dirt. Apply treatment to zinc coated surfaces which have not been mill-phosphatized. Coat welded and abraded areas of zinc-coated surfaces with galvanize repair paint. Apply 1.5 MIL (dry film thickness) metal primer coating, followed by two 1.0 MIL (dry film thickness) metal enamel finish coatings.

### 3.01 INSPECTION AND PREPARATION

- A. Inspect all submittals to see that they do not conflict with documents published by Architect/Engineer/Consultant. FSEC is responsible for verifying all dimensions, quantities, construction details, finishes, sizes, etc.
- B. Rough-In Work: FSEC must visually examine the rough-in mechanical and electrical services by others, prior to pouring of floors or closing of walls, and the installation of floors, walls, columns and ceilings by others, and the conditions under which the work is to be done. He must visually verify dimensions of the services and substrates before fabricating the work.

### 3.02 INSTALLATION

- A. Installation shall include assembly of all equipment in required positions as shown; leaving same with threaded outlet of type of construction or connection as standardized by commercial food service equipment manufacturers, or as called for in itemized specifications, for other contractors to make final electrical, steam, gas, water, waste and ventilating connections, unless otherwise specified.
1. FSEC shall coordinate all information required by other trades relating to FSEC's equipment.
  2. Work specified to be done by FSEC, but due to jurisdictional agreements and/or conditions must be done by others, shall be sublet by FSEC or other agreements made at his expense.
- B. FSEC shall ascertain the date of complete Owner takeover and govern his installation so as to have all equipment installed, connected and tested at least five (5) days prior to that date.
1. FSEC shall notify in writing all trades involved in final connections



- of Food Service Equipment not less than five (5) days prior to beginning his installation.
2. Once initiated, FSEC's installation shall be continuous and FSEC's supervisor shall remain at project site during normal working hours, daily, from day first piece of equipment is delivered until all equipment is installed and connected.
  3. Pressure Vessels: FSEC shall notify Department of Labor, Boiler Inspection Division, in writing at least two weeks prior to completion of installation, requesting inspection of Pressure Vessels, if applicable.
  4. Fire Control (Hood Systems): FSEC shall notify State Fire Marshall in writing at least two weeks prior to completion of installation, requesting inspection of Hood and Fire Suppression Systems, if applicable.
- C. All equipment resting against walls, floors, ceilings and/or other equipment shall be sealed with mastic sealer as specified under Paragraph 2.03 A (2).
- D. All horizontal runs of piping and conduit shall be a minimum of 6 inches above finished floors and 3 inches out from all walls.
- E. FSEC must furnish and install any item of equipment, trim or accessory that is required by any of the applicable rules, regulations and codes governing this project, but not specified or shown on drawings.
1. Any extra charge for such compliance shall not be allowed.
  2. Drawings and Specifications shall govern where their requirements are in excess of said rules, regulations and codes.
  3. Said rules, regulations and codes shall govern wherever Drawings and Specifications violate such.
- F. FSEC is responsible for ingress to installation locations.
1. Removal and replacement of any door, door frame, wall, window, or other portion of building for access is responsibility of FSEC and he shall assume all cost for such work.
  2. If special hoisting equipment and operators are required, FSEC shall include such costs.
- G. FSEC is responsible during progress of project for protection of his equipment against fire, theft, damage, etc., until date of final acceptance by Architect/Consultant and/or Owner.

### 3.03 JOINTING AND ANCHORING

- A. Set each item of non-mobile and non-portable equipment securely in place, leveled and adjustable to correct height. Anchor to supporting substrate where indicated and when required for sustained operation and use without shifting or dislocation. Conceal anchorage wherever possible. Adjust counter tops and other work surfaces to a level tolerance of 1/16 inch.
- B. Complete field assembly of joints in the work (joints which cannot be completed in the shop) by welding, bolting, gasketing, or similar methods as indicated. Grind welds smooth and restore finish. Set or trim gaskets flush except for "T" gaskets as indicated.
- C. Treat enclosed spaces (inaccessible after equipment installation) by covering horizontal surfaces with powdered borax at a rate of 4 oz. per sq. ft. This also applies to the space between building walls and Cold Storage Assemblies.
- D. Install closure panels and strips where required, with joints coordinated with units of equipment.
- E. Where two or more similar items of one manufacturer are installed adjacent to each other, including back to back, trim strips of same material and finish shall be installed between units so as to give the appearance of a single unit.
- F. Where equipment rests on legs adjacent to similar equipment so mounted, spacing between legs shall be a minimum of 12 inches on center to allow for proper cleaning between legs.
- G. Fabricated substitutions are not acceptable in a line-up of buy-out equipment, unless so specified.

### 3.04 CLEANING, RESTORING FINISHES

- A. After completion of installation, and completion of major work in Food Service Areas, remove protective coverings, if any, and clean Food Service Equipment, internally and externally. Restore exposed and semi-exposed finishes to remove abrasions and other damages. Polish exposed metal surfaces and touch-up painted surfaces. Replace work which cannot be successfully restored.

### 3.05 TESTING, START-UP AND DEMONSTRATION

- A. General: Delay the start-up of Food Service Equipment until service lines have been tested, balanced, and adjusted for pressure, voltage and similar considerations, and until water lines have been

cleaned and treated for sanitation.

- B. Test each item of operational equipment to demonstrate that it is operating properly, and that controls and safety devices are functioning. Repair or replace equipment which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.
- C. Final Cleaning: After testing and start-up, clean and sanitize the Food Service Equipment, and leave in a condition ready for use in food service.
- D. After compliance of the work and after the final inspection has been completed and approved scheduled demonstration must take place for all items of equipment. Such demonstration shall be supervised by Architect/Consultant/Owner and an authorized agent for each item of equipment shall conduct the demonstration, showing operational as well as preventive maintenance procedures. When possible provide owner with manufacturer's CD illustrating operation procedures of equipment for future reference.

#### SECTION 11400 - FOOD SERVICE EQUIPMENT SPECIFICATIONS

##### **ITEM #1 CASHIER STATION, DOUBLE**

FOOD SERVICE EQUIPMENT

11400-13

Provide and install where shown, one (1) only Cashier Station with the following features:  
To be Double Mobile Cashier Station.

To be configured as per plan drawing.

Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.

Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.

Counter Bodies will be built standard unitized construction

Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge

Sound Deadening Mastic Applied Between Metals

Solid "V" ridge tray slides as shown, mounted at elementary school height.

Cash Drawer with Lock each cashier.

Undershelf to accommodate Computer Towers and act as foot rest.

Undershelf to be constructed of 16 gauge type 304 stainless steel.

3" Hole in Top with Grommet for Cords, 2 each

Receptacle Below Top, 2 each

Data Receptacle Below Top, 2 each

Stainless Steel Exterior trimmed with 14 gauge 1 3/4" x 1 3/4" Stainless Steel Trim

Cord & Plug 5-15P plug with 6' Cord

5" Swivel Casters with Locks

Double Mobile Cashier Station to be manufactured by listed Approved Fabricator in section 1.09, C of these documents or prior approved equal.

#### **ITEM #2 MILK COOLER – EXISTING EQUIPMENT**

#### **ITEM #3 MOBILE UTILITY UNIT, 2**

Provide and install as shown Two (2) Mobile Utility Stations with the following features:

Each station to be 30" wide x 36" long x 24" high to act as tray pickup stations.

Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.

Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.

Counter Bodies will be built standard unitized construction

Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge

Sound Deadening Mastic Applied Between Metals

Line-Up Locks

5" Swivel Casters (4) with Locks

Mobile Utility Unit to be manufactured by listed Approved Fabricator in section 1.09, C of these documents or prior approved equal.

#### **ITEM #4 HOT FOOD UNIT, 2**

Provide and install as shown two (2) Hot Food Stations with the following features:

Each Hot Food Station to be length as shown x 30" Wide

Unit to be UL Approved and Labeled

Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.  
Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.  
Counter Bodies will be built standard unitized construction  
Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge  
Sound Deadening Mastic Applied Between Metals  
Provided with 7" stainless steel rear fold down work shelf.  
Bottom Shelf-Where Possible. Bottom Shelf to be 18 gauge stainless steel.  
Line-Up Locks  
To include full-length fold-down solid "V" ridge tray slide. Tray slide mounted at elementary school height.  
Four (4) Alto-Shaam Drop-In Waterless Hot Food Wells-To be rated NSF-7 and fabricated – Individual Controls and Large Flange.  
Each Hot Food Well to be 12" wide x 20" long, UL Listed, Electric Dry-Halo Heat, Individually Switched.  
Deluxe Single Service Fully Adjustable Protector Guard- Display Lights-Fabricated from 1 5/8" O.D. 16 Gauge Tubing, 1/4" Safety Glass with Glass Enclosure at Each End  
Stainless Steel exterior trimmed with 14 gauge 1 3/4" x 1 3/4" Stainless Steel Trim  
120/208-230v, 1Ph with Cord & Plug.  
5" Swivel Casters (4) with Locks

Hot Food Units to be manufactured by, but not limited to, approved fabricator listed in Section 1.09, C of these documents or prior approved equal.

#### **ITEM #5      MOBILE UTILITY UNIT, 2**

Provide and install as shown two (2) Mobile Utility Units with the following features:

Each Utility Station to be 24" Long x 30" Wide  
Unit to be UL Approved and Labeled  
Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.  
Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.  
Counter Bodies will be built standard unitized construction  
Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge  
Sound Deadening Mastic Applied Between Metals  
Provided with 7" stainless steel rear fold down work shelf.  
Bottom Shelf-Where Possible. Bottom Shelf to be 18 gauge stainless steel.  
Line-Up Locks  
To include full-length fold-down solid "V" ridge tray slide. Tray slide mounted at elementary school height.

Mobile Utility Units to be manufactured by, but not limited to, approved fabricator listed in Section 1.09, C of these documents or prior approved equal.

#### **ITEM #6      MOBILE COLD FOOD UNIT, 2**

Provide and install as shown two (2) Mobile Cold Food Units with the following features:

Each Cold Food Station to be length as shown (to accommodate one (1) sheet pans) x 30" Wide  
Unit to be UL Approved and Labeled  
Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.  
Top to be recessed at cold well to accommodate one (1) 18" x 26" standard sheet pan.  
Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.

Counter Bodies will be built standard unitized construction  
Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge  
Sound Deadening Mastic Applied Between Metals  
Provided with 7" stainless steel rear fold down work shelf.  
Bottom Shelf-Where Possible. Bottom Shelf to be 18 gauge stainless steel.  
Line-Up Locks  
To include full-length fold-down solid "V" ridge tray slide. Tray slide mounted at elementary school height.  
Deluxe Single Service Fully Adjustable Protector Guard- Display Lights-Fabricated from 1 5/8" O.D. 16 Gauge Tubing, 1/4" Safety Glass with Glass Enclosure at Each End  
Stainless Steel exterior trimmed with 14 gauge 1 3/4" x 1 3/4" Stainless Steel Trim  
Mobile Cold Unit includes a refrigerated cold pan, with 3" recess, 9" deep overall, built into the top, constructed of 18 gauge, type 304 stainless steel. The pan is fully insulated with high density polystyrene, 1" thick on all sides, 2" thick on the bottom, and enclosed with a 22 gauge galvanized steel outer case. The interior liner is fabricated of 1/4" radius coved corners. The liner has copper tubing firmly soldered to the top 3" on all sides. A 3/4" dia. drain with strainer, 4" PVC nipple and valve is provided. Separator channels & inserts to hold 12" x 20" food pans are included.  
**REFRIGERATION SYSTEM:** The compressor housing shall be fabricated from formed 14 gauge galvanized and bolted to the base of the unit. A fully self-contained condensing unit is provided with a hermetically sealed compressor and a digital electronic thermostat/thermometer. The system is fully charged with CFC free refrigerant and ready to operate.  
**ELECTRICAL:** The unit will be wired for 15 amps., 120 volt, single phase operation, with an on/off thermostat switch and pilot light. A 6' long, 3-wire cord and plug (NEMA-5-15P) will be provided.  
5" Swivel Casters (4) with Locks

Mobile Cold Food Units to be manufactured by, but not limited to, approved fabricator listed in Section 1.09, C of these documents or prior approved equal.

**ITEM #7 ICE CREAM FREEZER – EXISTING EQUIPMENT, ONE (1) EACH AS SHOWN**

**ITEM #8 MOBILE AMBIENT UNIT**

Provide and install as shown two (2) Mobile Ambient Units with the following features:

Each Utility Station to be 24" Long x 30" Wide  
Unit to be UL Approved and Labeled  
Counter Top to be fabricated from 14 Gauge type 304 Stainless Steel with top turned down on all sides.  
Counter Base and Body to be fabricated using 18 Gauge Stainless Steel.  
Counter Bodies will be built standard unitized construction  
Top to be braced with Stainless Steel Hat Channel 14 or 16 Gauge  
Sound Deadening Mastic Applied Between Metals  
Provided with 7" stainless steel rear fold down work shelf.  
Bottom Shelf-Where Possible. Bottom Shelf to be 18 gauge stainless steel.  
Deluxe Single Service Fully Adjustable Protector Guard- Display Lights-Fabricated from 1 5/8" O.D. 16 Gauge Tubing, 1/4" Safety Glass with Glass Enclosure at Each End  
Stainless Steel exterior trimmed with 14 gauge 1 3/4" x 1 3/4" Stainless Steel Trim  
Mobile Ambient Unit includes a single drop-in ambient food well. Food well to accommodate full size steam table pan.  
Line-Up Locks  
To include full-length fold-down solid "V" ridge tray slide. Tray slide mounted at elementary school height.

Mobile Ambient Unit to be manufactured by, but not limited to, approved fabricator listed in Section 1.09, C of these documents or prior approved equal.

**ITEM #9 HAND SINK, 5 – IN MECHANICAL SECTION**

**ITEM #10 PASS-THRU HEATED CABINET, 2**

Provide and install as shown two (2) each Pass-Thru Heated Cabinets with the following features:

To be two-section Pass-Thru hot food holding cabinets.  
To have stainless steel interior and exterior.

**HEATING SYSTEM**

Self contained, performance rated heating system  
90°F to 180°F temperature range  
Top mounted heating plenum “plug” with circulating fan  
Unique air flow distribution ducts

**CABINET ARCHITECTURE**

3” non-CFC polyurethane foam insulation  
Smooth, polished chrome workflow door handles  
Cam action, lift off hinges  
Self-closing doors  
Magnetic snap in Santoprene™ door gaskets  
Cylinder lock in each door  
Heavy duty, chrome plated steel shelves  
Heavy duty pilaster strips  
Adjustable 6” stainless steel legs

**MODEL FEATURES**

Automatic interior lighting  
Electronic controller with digital display & hi-low alarm  
Stainless steel strip heaters located in base of interior

**SHELVING**

- Each section to have both universal tray slides and adjustable shelves. The upper half of each door section to have universal slides to be adjustable at 2” increments. The lower half of each door section to have two (2) coated wire shelves that are adjustable at 2” increments.

**DOORS**

- Double pane thermal insulated glass on Kitchen side; Solid stainless steel on serving line side.

**ELECTRICAL**

208-230/115 volt 1Ph., 15.5 amps.

**FOOD SERVICE EQUIPMENT**

**DIMENSIONS**

57" long x 38-3/4" deep x 83-1/4" high

**CAPACITY**

52 cu ft

Pass-Thru Heated Cabinets to be manufactured by, but not limited to, Continental Refrigerator, Bensalem, PA. To be two (2) each Model DL2WE-SS-PT Pass-Thru Heated Cabinets with options and accessories as specified or approved equal.

**ITEM #11 PASS-THRU REFRIGERATOR, 2**

Provide and install as shown two (2) each Pass-Thru Refrigerators with the following features:

To be two-section wide-width Pass-Thru refrigerated cabinets.

To have stainless steel exterior and interior.

**REFRIGERATION SYSTEM**

Self contained, performance rated "plug" refrigeration system

Natural, environmentally safe, high efficiency R-290 refrigerant<sup>1</sup>

Refrigeration system is readily accessible on top of cabinet, separate from the "food zone"

Automatic, hot gas condensate evaporator

Expansion valve system

**CABINET ARCHITECTURE**

3" non-CFC polyurethane foam insulation

Smooth, polished chrome workflow door handles

Cam action, lift off hinges

Self-closing doors

Magnetic snap-in Santoprene™ door gaskets

Cylinder lock in each door

Heavy duty pilaster strips

Heavy duty, epoxy coated steel shelves

Adjustable 6" stainless steel legs

**MODEL FEATURES**

LED interior lighting

Electronic controller with digital display & hi-low alarm

Off-cycle defrost

Top and side air distribution ducts

Cabinet upper side panels and refrigeration "plug"

**SHELVING**

- Each section to have both universal tray slides and adjustable shelves. The upper half of each door section to have universal slides to be adjustable at 2" increments. The lower half of each door section to have two (2) coated wire shelves that are adjustable at 2" increments.



**DOORS**

•Double pane thermal insulated glass on Kitchen side; Solid stainless steel on serving line side.

**ELECTRICAL**

115v, 1Ph, 6.4 amps

**DIMENSIONS**

57" long x 38-3/4" deep x 83-1/4" high

**CAPACITY**

52.0 cu ft

Pass-Thru Refrigerators to be manufactured by, but not limited to, Continental Refrigerator, Bensalem, PA.

To be two (2) each Model D2RENSST Pass-Thru Refrigerators with Options and Accessories as specified or approved equal.

**ITEM #12 CLEAN DISHTABLE – SLANTED WALL SHELF**

Provide and install as shown one (1) only Clean Dishtable and Slanted Wall Shelf with the following features:

CLEAN DISHTABLE to be size and shape per drawings as per drawings, right-to-left design.

Top to be a 14 gauge type 304 stainless-steel with 3" high semi-roll on front, 11" backsplash at rear wall with 2" return on a 45 degree angle with a 3/4" turndown on back.

Legs to be 1-5/8" O.D. 16 gauge type 304 tubular stainless steel with stainless steel fully enclosed sockets and adjustable flanged feet.

Clean Dishtable to have undershelf. Undershelf to be of 16 gauge type 304 stainless steel fully welded, to be 10" above finished floor with turndowns on front and open areas and 2" turn-up at walls.

SLANTED WALL SHELF with the following features::

A solid die formed wall mounted rack shelf with solid end brackets.

**CONSTRUCTION:**

TIG-welded with exposed areas blended to a satin finish.

**MATERIAL:**

Brackets are 16 gauge type 300 series stainless steel.

Shelf is 16 gauge type 300 series stainless steel.

Dimensions: 16" D x 62" L

Drip tube – right end of shelf

Clean Dishtable and Slanted Wall Shelf to be manufactured as specified by approved fabricator listed in Section 1.09, C of these documents.

**ITEM #13 COILING SHUTTER DOOR – IN ARCHITECTURAL****ITEM #14 SOILED PASS-THRU TABLE**

Provide and install as shown one (1) only Soiled Pass-Thru Table with the following features:

Soiled Table to be size and shape as shown on drawings.

Top to be a 14 gauge type 304 stainless-steel with 3" high semi-roll on front and open the ends. 11" backsplash at walls with 2" return on a 45 degree angle with a 3/4" turndown on back. Omit backsplash at soiled tray drop-ledge section.

Provide through-wall drop-off ledge to waiter/waitress corridor length as shown (VERIFY by field measurements). Drop-off ledge to have marine "v" edge with 2" straight turndown and return to wall in cafeteria. Provide split type pass-thru frame as shown on drawings.

**VERIFY WALL THICKNESS DIMENSION AND HEIGHT AT DROP-OFF LEDGE.**

Provide one (1) 48" long x 14" deep flat 14 gauge type 304 stainless steel pass shelf mounted on 1" type 304 stainless steel tubing. Shelf to have 1-1/2" turndowns and returns on sides and ends as shown on drawing. Shelf to fit between walls and split type frame of pass-opening. Shelf may extend minimum distance possible over dishtable, but not to protrude into cafeteria (determined by wall thickness). Bottom of lower shelf to be located 14" above dishtable top. Provide stainless steel top cap with 3" turn-up and return to wall as shown.(FSEC to VERIFY dimensions by field measurements)

Provide knockouts on 8" centers in table top for deck-mount pre-rinse unit as indicated in specifications and drawings.

Pre-Rinse Unit to be spring style, deck mount, pre-rinse with ultra spray valve and wall bracket.

**FEATURES:**

**CONTROL VALVE**

- ECCENTRICS ADJUST FROM 7-1/2" TO 8-1/2"
- INTERNAL SPRING LOADED CHECK VALVES
- SWIVELLJNG SEAT DISKS
- HOT SIDE STEM - RIGHT HAND, COLD - LEFT HAND
- STAINLESS STEEL SEATS
- STAINLESS STEEL SEAT SCREWS
- STAINLESS STEEL HANDLE SCREWS

**HOSE**

- 36" LENGTH
- STAINLESS STEEL END FITTINGS
- STAINLESS STEEL EXTERNAL JACKET
- 3 PLY FIBER REINFORCED INTERNAL RUBBER HOSE
- REPAIRABLE IN FIELD WITH SIMPLE TOOLS

**STANDARD SPRAY VALVE**

- NOZZLE THREADED INTO VALVE
- 2.65 GPM AT 80 PSI
- SHOWER SPRAY PATTERN

**ULTRA SPRAY VALVE**

- NOZZLE THREADED INTO VALVE
- 1.60 GPM AT 80 PSI
- KNIFE SPRAY PATTERN

**WALL BRACKET**

- ADJUSTS FROM 2" TO 12"

**RECOMMENDED SETTINGS**

- 110°F AT 80 PSI

**SYSTEM LIMITS**

- TEMP: 40°F MIN. TO 140°F MAX.
- PRESSURE 200 PSI MAX. STATIC

**ACCESSORIES**

Wrist style handles  
Nipples and Elbows for installation  
Vandal resistant kit

Provide cutout in table top for Item #30 Scrapper as shown.  
Provide Undershelf from bend of "L" to right table end.  
Legs to be 1-5/8" O.D. 16 gauge type 304 tubular stainless steel with stainless steel fully enclosed sockets and adjustable flanged feet. Crossrails to be 1-5/8" O.D. 16 gauge type 304 stainless steel located 10" AFF. Include stainless steel leg stantions to wall where possible for table stability.  
No Undershelf at Scrapper location and omit crossrails and legs as needed for Scrapper installation.  
FSEC TO VERIFY

Soiled Pass-Thru Table to be manufactured by approved fabricator listed in Section 1.09, C of these documents.

Pre-Rinse Unit to be manufactured by, but not limited to, Fisher Mfg., Tulare, CA. To be one (1) Model 2310-WB with Accessories specified or approved equal.

**ITEM #15 THREE-COMPARTMENT SINK**

Provide and install as shown one (1) only Three-Compartment Sink with the following features:

Three Compartment Sink to have one piece deep drawn sink bowls with integral 24" drainboards left and right, 11" backsplash. Overall dimensions: 127" long x 31" deep x 37" working height. Each compartment to be 24" x 24" x 14" water level. All sink bowls to have a liberal 3" radius.  
Welded stainless steel lever drain handle brackets.

Construction: To be all TIG welded.

Welded areas to be blended to match adjacent surfaces and brought to a satin finish.

Gussets welded to a die-embossed reinforced channel.

Waste drains are to be 1-1/2" IPS Lever type.

Material:

Bowls: 14 gauge type 304 stainless steel  
Top: 14 gauge type 304 stainless steel  
Legs: 1-5/8" diameter tubular stainless steel  
Stainless steel gussets  
1" adjustable metal bullet feet  
Extra front and rear crossbrace

**ACCESSORIES**

Provide and install two (2) only faucets with the following features: Faucets to be wall mount on 8" centers. To have lever handles and 3/4" IPS eccentric flanged female inlets. Faucets to have 14" swivel spouts.

Provide three (3) lever drains with the following features:

Each Lever Drain to have dual teflon seals, stainless steel balls, cast red brass body, extra sturdy stainless steel clamping ring. To have clear through opening ( no need to disassemble if snaking is

required ). To have industry standard sealing angle ( fits flush to standard stainless steel sinks ). Stainless steel flat strainer. 1/4" turn to fully open and close valve.  
Drain rate of 12 GPM.

Three Compartment Sink to be manufactured by, but not limited to, Advance-Tabco, Edgewood, NY or approved fabricator listed in section 1.09, C of these documents. To be Advance-Tabco Model 94-43-72-24RL or prior approved equal.

(Advance-Tabco Model used for reference only)

Faucets to be manufactured by, but not limited to, Fisher Manufacturing Company, Tulare, CA. To be two (2) each Model 5414 or prior approved equal.

Lever Drains to be manufactured by, but not limited to, Fisher Manufacturing Company, Tulare, CA. To be three (3) each Model 22209 with flat strainer as specified or prior approved equal.

### **ITEM #16      WAREWASHER**

Provide and install as shown one (1) only Warewasher with the following features:

To be High-Temperature Warewasher with 70 degree rise Booster Heater for right-to-left operation.

Warewasher

#### **Standard Features**

25" clearance accommodates larger wares, such as sheet pans, mixing bowls, etc.

Exclusive EnergyGuard™ controls

Fully automatic, including auto-fill

Electromechanical controls

Adjust-A-Peak™ adjustable conveyor speed allows machine to extend wash time and rinse contact for heavy soil conditions

Self-draining stainless steel wash pump

Stainless steel scrap baskets

Splash shields

Front dress panel

Externally operated drain lever

Adjustable bullet feet

Stainless steel frame and legs

Exhaust vent fan control

18kW wash tank heater

#### **Specifications**

High-temperature model uses 0.68 gallons (2.57 liters) per rack.

High-temperature model cleans 225 racks per hour.

8" (203 mm) splash shields on both wash and rinse ends

25" (635 mm) chamber height clearance accommodates larger wares

18" (457 mm) wash section with an 18" (457 mm) separation between wash and rinse

Durable stainless steel construction

Dimensions: 75-1/2" High x 25" Deep x 44" Wide

Operating Capacity: (High Temperature) 225 racks/hr

Electrical Requirements: 208v, 3Ph, 56.7 amps

Venting Requirements: Input End 200 CFM; Output End 400 CFM

Warewasher Accessories

Flanged Feet  
Vent Cowl Collars (set of two) VERIVY CEILING HEIGHT  
Drain Quench System  
Two (2) each Sheet Pan Racks

Provide with Booster Heater  
Booster Heater to facilitate 70 degree rise – 30KW  
Electrical: 230v, 3Ph, 51.9 amps

Warewasher and Booster Heater to be manufactured by, but not limited to, Jackson WWS, Inc. Gray, KY.  
To be Model AJX-44 Warewasher with Accessories as specified and 70 degree rise Booster Heater or approved equals.

#### **ITEM #17      CONDENSATE DUCTS**

Provide a set of two each Condensate Ducts with the following features:

Ducts to be size and shape as shown on drawings. To be constructed as to extend into Dishmachine vent cowl openings (seal water tight). Ducts to be constructed of 18 gauge type 304 stainless steel and extend 6" above finished ceiling to provide connection for pant leg duct to exhaust fan provided by Mechanical Contractor.

Each duct to include 16 gauge stainless steel fully welded collar and angle trim at ceiling.  
(See detail drawing)

Condensate Exhaust Ducts to be fabricated by, but not limited to, approved fabricator listed in Section 1.09, C of these documents.

#### **ITEM #18      SPARE NUMBER**

#### **ITEM #19      CONDENSATE EXHAUST FAN – IN MECHANICAL SECTION**

#### **ITEM #20      FILTER SYSTEM, ICE MAKER**

Provide and install as shown one (1) only Water Filter with the following features:

- Water Filter to reduce water-related ice machine problems caused by scale build-up from dirt and dissolved minerals.
- Improved filter media inhibits the growth of bacteria.
- Reduces chlorine taste and odor and other offensive contaminants.
- Self-contained scale inhibitor feed keeps ice machines functioning at full capacity.
- Reduces maintenance and service costs by reducing scale and clogging of distribution lines, evaporator plate and pump.
- Precoat submicron technology reduces dirt and particles as small as ½ micron in size and reduces possible health contaminants such as cysts.
- NSF Certified under NSF/ANSI Standards 42 and 53.
- Provided with wall mounting bracket.

- Rated Capacity: 9,000 gallons
- Provide one (1) extra replacement filter cartridge.

Water Filter System to be manufactured by, but not limited to, Everpure, LLC, Hanover Park, IL. To be one (1) Model EV9324-01 Insurice Single – i2000(2) System with Model EV9612-22 i2000(2) replacement cartridge or prior approved equals.

#### **ITEM #21 ICE MAKER W/BIN – EXISTING EQUIPMENT**

#### **ITEM #22 FLOOR TROUGH**

Provide and install one (1) each Floor Trough with the following features:

Waste receptacle to accommodate up to a 4" waste pipe.

Includes 4" O.D. – 3" long plumbing sleeve.

Removable perforated stainless steel strainer basket with handle.

Pitched toward waste.

Subway style grating from 3/16" x 1" solid 1" solid type 304 stainless steel bar.

Grating is spaced 9/16" ( inside clearance ) between bars to prevent casters from getting trapped.

##### Construction

- All TIG welded
- All external corners welded and polished to a satin finish

##### Mechanical

- Creased design to ensure proper drainage
- Perimeter flange mounts directly to sub floor
- 3/4" vertical step design to accommodate floor tile installation

##### Material

- 14 gauge 304 type stainless steel polished stainless steel grating

##### Dimensions

- 12" x 24" x 4" deep

##### ACCESSORIES

Include Anti-Splash Guard

Floor Troughs to be manufactured by, but not limited to, Advance Tabco, Edgewood, NY or approved fabricator listed in Section 1.09 C of these documents. To be Advance Tabco Model FTG-1224 as specified or approved equal.

(Advance Tabco Model used for reference only)

#### **ITEM #23 REACH-IN REFRIGERATOR – EXISTING EQUIPMENT**

#### **ITEM #24 MOBILE WARMING CABINET – EXISTING EQUIPMENT**

**ITEM #25      WORK TABLE**

Provide and install as shown one (1) only Work Table with the following features:

Work Table to be 30" wide x 108" long x 34-1/2" to 35-1/2" adjustable working height.

Top to be 14 gauge type 304 stainless-steel. Stainless steel hat channels.

Provide sound deadening (see section 2.07, C (2) of these documents).

Work Table to have welded undershelf. Undershelf to be constructed of 18 gauge type 304 stainless-steel, located 10" above finished floor.

To have one (1) 20" X 20" X 5" deep stainless-steel drawer with roller bearing full extension slides and die stamped front, in stainless-steel fully enclosed vermin proof housing.

Legs to be 1-5/8" O. D., 16/304 tubular stainless-steel, stainless-steel gussets, stainless steel adjustable bullet feet.

Work Table to be manufactured by, but not limited to, approved Fabricator in section 1.09, C of these documents or prior approved equal.

**ITEM #26      BAKERS TABLE**

Provide and install one (1) only Bakers Table with the following features:

Bakers Table to be 30" x 60". Top to be 14 gauge stainless steel type 304.

Crossbracing to be 1 1/4" tubular stainless steel. Legs to be 1 5/8" O.D. 16/304 tubular stainless steel, stainless steel gussets, stainless steel hat channel, and adjustable 1" stainless steel feet. To have 10" high 90 degree backsplash with 1" turn at 90 degrees.

To include Pot Filler.

Pot Filler to be splash mounted on 8" centers where shown on drawing.

To have wrist style handles

**FEATURES****CONTROL VALVE**

- \* 3/4" ADJUSTABLE WALL MOUNT
- \* SWIVEL OUTLET
- \* ECCENTRICS ADJUST FROM 7-1/2" TO 8-1/2"
- \* INTERNAL SPRING LOADED CHECK VALVES
- \* SWIVELING SEAT DISKS
- \* HOT SIDE STEM - RIGHT HAND
- \* COLD SIDE STEM - LEFT HAND
- \* STAINLESS STEEL SEATS
- \* STAINLESS STEEL SEAT SCREWS
- \* STAINLESS STEEL HANDLE SCREWS
- \* 3/4"F NPT INLETS

**HOSE**

- \* 72" LG. HEAT MASTER FDA NITRILE/ARAMID
- \* NSF-51 (100 PSI W.P. AT 300°F) CONSTANT
- \* RENEWABLE END FITTINGS & BUMPER
- \* 360° SWIVEL

**POT FILLER SPOUT**

- \* NON-MARRING SPOUT
  - \* SHUT-OFF VALVE
  - \* 360° SWIVEL ELBOW
- SYSTEM LIMITS
- \* TEMP: 40°F MIN. TO 140°F MAX.
  - \* PRESSURE 200 PSI MAX.

Bakers Table to be manufactured by approved fabricator listed in Section 1.09 D of these documents.  
Pot Filler to be manufactured by Fisher Manufacturing, Tulare, CA. To be Model 2305 as specified.

### **ITEM #27      INGREDIENT BIN, 3**

Provide three (3) each Ingredient Bins with the following features:

Ingredient Bins – 3 each

- Stores and transports a wide variety of dry ingredients such as flour, sugar, rice or grains.
- To be 27 gallon capacity to meet standard industry requirements for storage and transportation of bulk foods.
- One-piece, seamless single-wall polyethylene bin construction is extremely durable. Won't rust or corrode. Liquids and dry foods will not stick or seep between seams.
- FDA accepted material. Meets all food contact requirements and eliminates need for liners.
- Smooth interior and exterior are easy to clean.
- Injection molded polycarbonate lids are transparent, break resistant and offer quick and easy identification of contents. Slide-back feature means easy access.
- Working height permits storage under standard bakers tables.
- Heavy-duty 3" (7,6 cm) casters, 2 front swivel, 2 fixed
- No assembly required.
- White with Clear cover.

Ingredient Bins must be manufactured by, but not limited to, Cambro Manufacturing, Huntington Beach, CA. To be three (3) Model IBS27 Bins as specified or prior approved equal

### **ITEM #28      FLOOR TROUGH**

Provide and install one (1) each Floor Trough with the following features:

Waste receptacle to accommodate up to a 4" waste pipe.

Includes 4" O.D. – 3" long plumbing sleeve.

Removable perforated stainless steel strainer basket with handle.

Pitched toward waste.

Subway style grating from 3/16" x 1" solid 1" solid type 304 stainless steel bar.

Grating is spaced 9/16" ( inside clearance ) between bars to prevent casters from getting trapped.

Construction

- All TIG welded
- All external corners welded and polished to a satin finish



**Mechanical**

- Creased design to ensure proper drainage
- Perimeter flange mounts directly to sub floor
- ¾" vertical step design to accommodate floor tile installation

**Material**

- 14 gauge 304 type stainless steel polished stainless steel grating

**Dimensions**

- 12" x 24" x 4" deep

**ACCESSORIES**

Include Anti-Splash Guard

Floor Troughs to be manufactured by, but not limited to, Advance Tabco, Edgewood, NY or approved fabricator listed in Section 1.09 C of these documents. To be Advance Tabco Model FTG-1224 as specified or approved equal.

(Advance Tabco Model used for reference only)

**ITEM #29 60 QT. MIXER – EXISTING EQUIPMENT****ITEM #30 SCRAPMASTER**

Provide and install in Item #14 Soiled Table one (1) only Disposer/Scrapper with the following features:

Unit to be 3HP, 230v, 3 Ph, 11.7 amps.

To be complete pre-flushing scrapping and disposing system with recirculating water.

To be for right to left operation.

Construction: 304 Stainless steel components.

Salvage Basin  
Disposer Safety Cover  
Adjustable Legs  
Control Panel

Electrical: Pre-wired NEMA 4X Panel  
Watertight Conduit/Fittings  
Separate Component Grounding  
Thermally Protected Motors  
Line Voltage Disconnect  
Disposer Safety Switch  
Operating Light

Plumbing: Corrosion Resistant Components  
Automatic Water Blender  
Solenoid Valve  
Unions  
Check Valves  
Incoming Water Valves  
Non-clogging Pump Design  
Backflow Prevention Device

**Quick Opening Drain Valve**

Unit to be shipped to fabricator for installation in the soiled dishtable.

Scrapmaster and accessories to be manufactured by, but not limited to, The Salvajor Company, Kansas City, MO. To be Model 300-PSM/230v Pot & Pan ScrapMaster or approved equal.

**ITEM #31      SPARE NUMBER****ITEM #32      WALK-IN COOLER/FREEZER**

Provide and install as shown one (1) only Walk-In Cooler/Freezer with the following features:

Walk-in Cooler/Freezer 20' 8" x 17' 4" x 8' 6" High (see drawing)

Insulation: 4" DURATHANE, all-urethane foamed-in-place (Class 1)

Exterior: Stucco Aluminum Interior Walls: Stucco Aluminum

Interior Ceilings: White Stucco Aluminum Interior Floors: .100 Treadbrite Aluminum

\*FLOOR PANELS NOT DESIGNED FOR ROLLING TRAFFIC OR PALLET JACK USE\*

Cooler, Freezer with Floor

(1) 34" x 76" Flush Mounted Entrance Door(s), with hardware, Pilot light & switch assembly, vapor proof light & dial thermometer. NSF LISTED

(1) 34" x 76" Flush Mounted Entrance Door(s) in corner door frame, with hardware, Pilot light & switch assembly, vapor proof light & dial thermometer. NSF LISTED

(2) Interior Ramp

(2) Door(s) with (2) Hinges per door

(2) Kason # 1806 LED light fixture at door(s)

(2) 14" x 14" peep window w/ heated frame & glass

(2) vinyl strip curtain

(2) Thermostatically controlled door frame heater(s)

(2) Pressure relief vent(s)

(4) 48" LED light fixture(s) w/ bulbs Ceiling & floor Splice

Ceiling suspension

Drain line trim as needed

Trim to ceiling as needed

1      1 1/2 HP, Remote Quick Connect Refrig. System Model RFO180E4SEAALNTQC8 208- 230/60/3 Medium Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R448A (8.7 Compressor RLA) with RL6A117ADAREQC 115/60/1 coil (1.6 amps) with Dual Speed EC motor and EcoNET Control Package with 35 ft quick-connect line kit.

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1      5 HP, Remote Quick Connect Refrig. System Model RFO500L4SEBNTQC8 208- 230/60/3 Low Temperature, base, weather hood, winter controls, Scroll, Air-cooled, R448A, No Defrost Provisions (17 Compressor RLA) with 2 RL6E066DDAREQC 208- 230/60/1 coil (1.0 fan amps, 9.8 heater amps) with Dual Speed EC motor and EcoNET Control Package with 35 ft quick-connect line kit.

5-year Compressor Warranties

Walk-In Cooler/Freezer and Accessories to be manufactured as specified by ThermoKool, Mid South Industries, Laurel, MS, Everidge/Thermalrite Refrigeration, Greenville, TN or approved equal.

**ITEM #33      FREEZER SHELVING**

Provide and install where shown, Freezer Shelving with the following features:

All Freezer Shelves and Posts to be epoxy coated with a minimum of a 15 year warranty.

Posts shall be of 1" O.D. round tubing, 16 gauge thickness. Posts shall have rolled grooves spaced on 1" centers. The top of each post shall have a finished plastic cap and the post bottom shall have a die cast insert with adjustable leveling foot. At each rolled groove there shall be consecutive numbers starting at the bottom of the post to facilitate installation of shelf clips.

Method of assembly shall be by the use of tapered locking plastic sleeves. Shelves shall be adjustable on 1" centers.

Wire Shelves shall be constructed of carbon steel wire and to consist of a top mat assembly using 10 gauge (.135" diameter) mat wires spaced on 7/8" centers and welded to full length 6 gauge (.187" diameter) inside support wires and serpentine trusses. Mat wires to be welded to a four-wire truss assembly at front and rear of shelf. Front and rear four-wire truss assembly is to be constructed of a 2 gauge (.250" diameter) bottom wire, a 6 gauge (.187" diameter) serpentine truss wire which creates a bridge-like reinforcement providing increased strength, and two 6 gauge (.187" diameter) top wires - one directly below mat wires and one directly above - which provide a pincer hold on mat wires.

Top mat assembly to be supported on each end by a three-wire truss assembly consisting of a 2 gauge (.250" diameter) bottom wire, a 6 gauge (.187" diameter) serpentine truss and one 6 gauge (.187" diameter) top wire.

Entire wire mat and truss assembly to be notched at outside corners to accept a 12 gauge conical-shaped collar, 1-5/8" in height which is to be welded in place. Conical-shaped collar is to be designed to accept a tapered ABS plastic split sleeve which clips over grooved post.

Freezer shelving to consist of Four (4) only Starter Units each with four 74" tall posts and four 24" x 54" shelves.

Freezer Shelving to be manufactured by, but not limited to, Eagle, Metal Masters Foodservice Equipment Company, Clayton, DE, InterMetro Industries Corporation, Wilkes-Barre, PA or approved equal.

#### **ITEM #34      FREEZER DUNNAGE RACKS**

Provide and install where shown Freezer Dunnage Racks with the following features:

Dunnage Racks to be of polyethylene construction. To have slotted tops for air circulation. All rack edges to have generous radius to prevent product snagging or marking. Each Rack to have weight capacity of 1500-lbs. Rack height to be 12". Each rack to be provide with two (2) separate interlocking keys for joining in end-to-end or back-to-back configurations. Joining system keys to drop in and be removable without the use of tools. Racks to be NSF approved.

Freezer Dunnage to be manufactured by, but not limited to, InterMetro Industries Corporation, Wilkes-Barre, PA or Eagle Group, Foodservice Equipment Division, Clayton, DE. To be Seven (7) each Metro Model HP2230PD.

(InterMetro Models used for reference only)

#### **ITEM #35      COOLER SHELVING**

Provide and install where shown, Cooler Shelving with the following features:

All Cooler Shelves and Posts to be epoxy coated with a minimum of a 15 year warranty. Posts shall be of 1" O.D. round tubing, 16 gauge thickness. Posts shall have rolled grooves spaced on 1" centers. The top of each post shall have a finished plastic cap and the post bottom shall have a die cast insert with adjustable leveling foot. At each rolled groove there shall be consecutive numbers starting at the bottom of the post to facilitate installation of shelf clips. Method of assembly shall be by the use of tapered locking plastic sleeves. Shelves shall be adjustable on 1" centers.

Wire Shelves shall be constructed of carbon steel wire and to consist of a top mat assembly using 10 gauge (.135" diameter) mat wires spaced on 7/8" centers and welded to full length 6 gauge (.187" diameter) inside support wires and serpentine trusses. Mat wires to be welded to a four-wire truss assembly at front and rear of shelf. Front and rear four-wire truss assembly is to be constructed of a 2 gauge (.250" diameter) bottom wire, a 6 gauge (.187" diameter) serpentine truss wire which creates a bridge-like reinforcement providing increased strength, and two 6 gauge (.187" diameter) top wires - one directly below mat wires and one directly above - which provide a pincer hold on mat wires. Top mat assembly to be supported on each end by a three-wire truss assembly consisting of a 2 gauge (.250" diameter) bottom wire, a 6 gauge (.187" diameter) serpentine truss and one 6 gauge (.187" diameter) top wire.

Entire wire mat and truss assembly to be notched at outside corners to accept a 12 gauge conical-shaped collar, 1-5/8" in height which is to be welded in place. Conical-shaped collar is to be designed to accept a tapered ABS plastic split sleeve which clips over grooved post.

Cooler shelving to consist of Four (4) only Starter Units each with four 74" tall posts and four 24" x 54" shelves, One (1) only Starter Unit consisting of four 74" tall posts and four 24" x 72" shelves and One (1) only Starter Unit consisting of four 74" tall posts and four 24" x 24" shelves..

Cooler Shelving to be manufactured by, but not limited to, Eagle, Metal Masters Foodservice Equipment Company, Clayton, DE or InterMetro Industries Corporation, Wilkes-Barre, PA.

### **ITEM #36 COOLER DUNNAGE RACKS**

Provide and install where shown, Cooler Dunnage Racks with the following features:

Dunnage Racks to be of polyethylene construction. To have slotted tops for air circulation. All rack edges to have generous radius to prevent product snagging or marking. Each rack to have weight capacity of 1500-lbs. Rack height to be 12". Each rack to be provide with two (2) separate interlocking keys for joining in end-to-end or back-to-back configurations. Joining system keys to drop in and be removable without the use of tools. Racks to be NSF approved.

Cooler Dunnage to be manufactured by, but not limited to, InterMetro Industries Corporation, Wilkes-Barre, PA or Eagle Group, Foodservice Equipment Division, Clayton, DE. To be Two (2) each Metro Model HP2230PD racks or prior approved equal. (Metro Model used for reference only).

### **ITEM #37 SPARE NUMBER**

### **ITEM #38 PAN RACK, 2 – EXISTING EQUIPMENT**

**ITEM #39      PREP TABLE WITH SINKS**

Provide and install as shown one (10 only Prep Table With Sinks with the following features:

To be 30" W x 96" L x 34-1/2' to 35-1/2" adjustable working height table.

Top to be 14 gauge type 304 stainless steel, to have marine edge on front, back and both sides at sink.

Top to include 10" high backsplash with 1" turn at 90 degrees.

At operator's right end include two (2) 20" x 20" x 12" deep sinks one with 3-1/2" drain opening, one with 6-1/2" drain opening to accept disposer (see detail drawing) Provide weldmount disposer control bracket in convenient operator location; faucet placement will be as shown on plan drawing. Faucet to be deck mounted and include spray unit.

Provide 1" knockouts on 8" centers for deck mounted faucet/spray unit.

Table to have welded undershelf underneath section that is not under the sinks and to allow for plumbing.

Undershelf to be constructed of 16-gauge type 304 stainless steel.

To have one (1) 20" X 20" X 5" deep stainless-steel drawer (center mounted above undershelf) with roller bearing full extension slides and die stamped front, in stainless-steel fully enclosed vermin proof housing.

Crossrails at sinks to be 1-5/8" O.D. 16 gauge type 304 stainless steel located at 10" above finished floor.

Legs to be 1-5/8" O.D. 16 gauge type 304 stainless steel tubing with stainless steel fully enclosed sanitary sockets and adjustable stainless steel bullet feet.

**ACCESSORIES**

Provide one (1) only sink faucet & spray as shown.

To be deck mount on 8" centers with 14" swivel type spout.

To have 1/2" water connections.

Prep Table With Sink to be manufactured as specified by, but not limited to, listed Approved Fabricator in section 1.09, C of these documents or prior approved equal.

**ITEM #40      DISPOSER, GARBAGE**

Provide and install where shown One (1) only Disposer with the following features:

Disposer to be 1.5 HP, 230v, 3Ph, 5.6 amps.

Mounting – rubber adaptor above grind chamber and rubber drain outlet. No metal to metal contact.

Exterior housing – permanent molded from heat treated, corrosion resistant aluminum alloy. Paint Free.

Shredder – 8" diameter, machine strength, wear resistant hardened carbide alloy.

Rotor – 8" diameter, 4 cutter bars

Motor – 1.5 HP totally enclosed. Fan and water cooled. Built in manual reset thermal overload protection.

Bearings – Tapered roller (top), sealed ball (bottom)

Seal-air and water seal

Waste Outlet – Rubber drain accepts 2" piping by removing drain insert.

Dual Direction Grinding – to have automatic reversing controls

Leg Support – single leg, adjustable

**ACCESSORIES:**

Provide one (1) 6-1/2" sink mounting assembly

Provide one (1) Manual Reversing Disposer Control

Disposer, sink assembly and disposer control to be manufactured by, but not limited to, The Salvajor Company, Kansas City, Missouri. To be One (1) each Model 150SA-MRSS as specified or approved equal.

**ITEM #41 COUNTER MIXER – EXISTING EQUIPMENT**

**ITEM #42 EQUIPMENT STAND – EXISTING EQUIPMENT**

**ITEM #43 SPARE NUMBER**

**ITEM #44 WORK TABLE – EXISTING EQUIPMENT**

**ITEM #45 SPARE NUMBER**

**ITEM #46 SPARE NUMBER**

**ITEM #47 ROTATING RACK OVEN WITH RACKS**

Provide and install as shown one (1) only Rotating Rack Oven with the following features:

To be natural gas fired, single rack capacity Rotating Rack Oven.

**Construction Features:**

- Fits under 6' 6" hood
- Gear drive rotation system
- Full view double pane windows
- Double doors open simultaneously and latch to prevent accidental opening during operation
- Solid, full-length door hinge shafts
- Bright xenon interior lighting
- Stainless steel interior and exterior
- Self contained steam generation system

**Performance Features:**

- 125 kBTU/hr heat input (natural gas)
- High efficiency heat exchanger
- 3/4 hp top-mounted convection motor
- Heavy duty rotation system with self-adjusting clutch

**Control Features:**

- **Digital Display Control** (standard):  
Two control modes with programmable features  
Single-step cooking mode:  
40 programmable recipes with 6 quick select buttons  
6-step cooking mode:

30 programmable recipes

Programmable features: Steam, Vent, Blower Delay and Pulse Air

Selectable Automatic Temperature Setback

- **Cook-and-Hold Control** (optional):

*Includes all features listed above for Standard Control, with the following exceptions:*

Settable to Bake Mode or Cook-and-Hold Mode

3 Cook -and-Hold Steam Hydration settings: no steam, light steam and heavy steam

3 quick-select buttons for pre-saved recipes

- 9 hour timer

**Installation Requirements:**

Factory authorized start-up required

Ships assembled. Will fit through 42" opening. Will fit through 36" opening with some disassembly

Must be installed under a hood

Floor must be noncombustible and supported by noncombustible structure extending not less than 12" from all sides; no buried utilities

Clearance to combustibles: 1" sides and back, 18" top

Natural Gas: 125,000 BTU/hr

Electrical: 120v, 1Ph

Water: 3 gph

Requires Drain

**ACCESSORIES**

Provide two (2) each LRR-MAX-16, 16-pan Racks

Provide Cook and Hold Control

Provide Water Connection Kit

Provide Water Filtration

Rotating Rack Oven and Accessories to be manufactured as specified by LBC Bakery Equipment, Inc. Marysville, WA. To be Model LMO Max-G Rotating Rack Oven with Accessories as specified or approved equal.

**ITEM #48 MOBILE WORK TABLE – EXISTING EQUIPMENT**

**ITEM #49 MICROWAVE – EXISTING EQUIPMENT**

**ITEM #50 DOUBLE CONVECTION OVEN**

Provide and Install as shown one (1) only Double Convection Oven with the following features:

To be double deck natural gas fired Convection Oven

**STANDARD FEATURES**

- Stainless steel front, sides, top, rear enclosure panel and legs.
- Independently operated stainless steel doors with double pane windows.
- Two 30,000 BTU/hr. burners per section, 120,000 BTU/hr. total input.
- Electronic spark igniters.

- 1/2 H.P. two speed oven blower-motors. 120/60/1 with 6' cord and plug. 8 amps per section, 16 amps total draw.
- Solid state temperature control adjusts from 150° to 500°F.
- Energy saving "Power Level" control allows the operator to adjust the heat input to the size of the load.
- 60 minute timer with audible alarm.
- Oven cool switch for rapid cool down.
- Porcelain enamel on steel oven interiors.
- Five nickel plated oven racks with eleven rack positions per section.
- 3/4" rear gas connection with combination gas pressure regulator and safety solenoid system.
- One year limited parts and labor warranty

**SPECIFICATIONS** Double section gas convection oven. Stainless steel front, sides, top, rear enclosure panel and legs. Independently operated stainless steel doors with double pane windows. Non-sag insulation applied to the top, rear, sides, bottom and doors. Porcelain enamel on steel oven interiors measure 29"w x 22 1/8"d x 20"h. Two interior oven lights per section. Five nickel plated oven racks per section measure 28 1/4" x 21 1/4". Eleven position nickel plated rack guides with positive rack stops. Two 30,000 BTU/hr. burners per section, 120,000 BTU/hr. total input. Electronic spark igniters. Furnished with two speed 1/2 H.P. oven blower motors. Side mounted solid state temperature controls adjust from 150° to 500°F. Power Level controls allows the operator to adjust the heat input from 15,000 BTU/hr. to a maximum input of 60,000 BTU/hr. in each oven section. 60 minute timers with audible alarm. Oven cool switch for rapid cool down. 120 volt, 60 Hz, 1 ph power supply required. 6' cord and plug. 8 amps per section, 16 amps total draw. Exterior Dimensions: 40 1/4"w x 42 3/4"d (includes door handles) 39 3/8"d x 72"h

#### ACCESSORIES

Provide unit on casters

Provide Posi-Stops

Provide (1) Gas Quick Disconnect Hose and positioning device.

Double Convection Oven to be manufactured by, but not limited to, Vulcan Hart, Louisville, KY. To be Model SG44D Natural Gas Double Convection Oven with Accessories as specified or approved equal. Gas Quick Disconnect to be manufactured by, but not limited to Dormont, Export, PA. to be Model 1675KITS48PS or prior approved equal.

#### **ITEM #51      DOUBLE CONVECTION OVEN**

Provide and Install as shown one (1) only Double Convection Oven with the following features:

To be double deck natural gas fired Convection Oven

#### STANDARD FEATURES

- Stainless steel front, sides, top, rear enclosure panel and legs.
- Independently operated stainless steel doors with double pane windows.
- Two 30,000 BTU/hr. burners per section, 120,000 BTU/hr. total input.
- Electronic spark igniters.
- 1/2 H.P. two speed oven blower-motors. 120/60/1 with 6' cord and plug. 8 amps per section, 16 amps total draw.
- Solid state temperature control adjusts from 150° to 500°F.
- Energy saving "Power Level" control allows the operator to adjust the heat input to the size of the load.
- 60 minute timer with audible alarm.



- Oven cool switch for rapid cool down.
- Porcelain enamel on steel oven interiors.
- Five nickel plated oven racks with eleven rack positions per section.
- 3/4" rear gas connection with combination gas pressure regulator and safety solenoid system.
- One year limited parts and labor warranty

SPECIFICATIONS Double section gas convection oven. Stainless steel front, sides, top, rear enclosure panel and legs. Independently operated stainless steel doors with double pane windows. Non-sag insulation applied to the top, rear, sides, bottom and doors. Porcelain enamel on steel oven interiors measure 29"w x 22 1/8"d x 20"h. Two interior oven lights per section. Five nickel plated oven racks per section measure 28 1/4" x 21 1/4". Eleven position nickel plated rack guides with positive rack stops. Two 30,000 BTU/hr. burners per section, 120,000 BTU/hr. total input. Electronic spark igniters. Furnished with two speed 1/2 H.P. oven blower motors. Side mounted solid state temperature controls adjust from 150° to 500°F. Power Level controls allows the operator to adjust the heat input from 15,000 BTU/hr. to a maximum input of 60,000 BTU/hr. in each oven section. 60 minute timers with audible alarm. Oven cool switch for rapid cool down. 120 volt, 60 Hz, 1 ph power supply required. 6' cord and plug. 8 amps per section, 16 amps total draw. Exterior Dimensions: 40 1/4"w x 42 3/4"d (includes door handles) 39 3/8"d x 72"h

#### ACCESSORIES

Provide unit on casters

Provide Posi-Stops

Provide (1) Gas Quick Disconnect Hose and positioning device.

Double Convection Oven to be manufactured by, but not limited to, Vulcan Hart, Louisville, KY. To be Model SG44D Natural Gas Double Convection Oven with Accessories as specified or approved equal. Gas Quick Disconnect to be manufactured by, but not limited to Dormont, Export, PA. to be Model 1675KITS48PS or prior approved equal.

#### **ITEM #52 STEAMER**

Provide and install as shown one (1) only Steamer with the following features:

##### Description

Steamer shall be a stainless steel double stacked pressureless steamer, each with a self-contained atmospheric 15.5 KW electric steam generator, per bulletin 140808 as follows:

##### Construction

Each steamer cavity and cabinet shall be all stainless steel construction with removable right and left side panels providing access to internal components.

Steamer doors are all stainless steel with strong continuous hinge and are field reversible for left or right swing, doors shall be provided with a one piece, replaceable seal. Easy open handle and latch shall provide positive lock and seal when door is pushed or slammed shut.

Hidden magnetic door switch cuts power to blower and shuts down power to generator when that door is opened.

Pan support racks shall be polished stainless steel and removable for easy cleaning. A stainless steel condensate collection tray is positioned under each cavity door.

##### Finish

Cabinet exterior including doors shall be finished to a No. 4 uniform finish. Cavity interiors are polished stainless steel. Control panel face plates shall be smudge resistant polyester film, ensuring maximum ease in cleaning and maintaining an attractive appearance.

**UL Listing**

Steamer shall be UL listed.

**Sanitation**

Unit shall be designed and manufactured to meet NSF codes and be NSF listed. Unit shall allow operator to delime steam generator through deliming port on top, without tools or service call. Push button auto-clean feature is standard.

**Controls**

Steamer controls shall include an ON-OFF power but- ton; 60 minute mechanical timer, with continuous steam setting; and READY light which indicates when cavity is warm and ready for steaming. Auto-clean button initiates deliming cycle for each unit.

**Performance Features**

Each steamer shall have a powerful side mounted blower, which increases steam velocity and provides efficient steam distribution throughout cavity and between loaded pans. Steam generator delivers 3.1 KW power input per 2-1/2" deep steam pan.

Heat up time to READY shall be 10 minutes or less, under normal conditions. Cavity is kept warm and ready for instant steam between loads. No cavity warm up required, after READY light comes on. delime indicator light warns operator of need to delime steam generator. Unit will shut off if water level is low. When power is turned "off", unit automatically blows down the steam generator to reduce sediment build-up.

Atmospheric Steam Generator Each unit shall have an electric heated rear mounted steam generator to provide atmospheric steam to the chamber at a temperature of approximately 212°F. Steam generator has an electric water sensor. Electric heating elements are replaceable from the side.

**ACCESSORIES**

Provide PureSteam water treatment system

Provide single cold water connection adapter

Provide steamer support stand

Dimensions: 65' High (on stand) x 33-3/8" Deep x 21-5/8" Wide

Electrical: 230/240v, 3Ph, 38.2 amps

Steamer to be manufactured by, but not limited to, Groen Mfg., Jackson, MS. To be one (1) Model (2)HY-5E/EF with Accessories as specified or approved equal.

**ITEM #53 FLOOR TROUGH**

Provide and install as shown, one (1) only Floor Trough with the following features:

- Heavy duty 14-gauge type 304 stainless steel all welded construction.
- To have built-in pitch towards drain to insure complete drainage.
- Stainless steel drain accommodates up to a 4" diameter pipe, and features a removable perforated stainless steel basket.
- To have subway-style stainless steel grating.
- To be anti-splash design floor trough.

Dimensions: 18" x 36" x total of 6" deep (installed as per drawings).

Floor Trough to be manufactured by, but not limited to, Eagle Group, Foodservice Division, Clayton, DE or approved fabricator listed in section 1.09, C of these documents. To be Eagle Model ASFT-1836-SS as

specified or prior approved equal.  
(Eagle Model used for reference only)

**ITEM #54      TILT SKILLET, 2**

Provide and install as shown one (1) each Tilt Skillet with the following features:

Tilt Skillet

**Description**

Braising pan shall be a Groen Eclipse™ Ergonomic Tilting Braising Pan – 40 Gallon, gas-heated, manual tilting braising pan with 10" deep pan on a rounded leg stand.

**Construction**

The pan body shall be of type 304 stainless steel, solid one-piece welded heavy-duty construction, with 10" pan depth. All exposed surfaces shall be of stainless steel. The cooking surface is a heavy 5/8" thick stainless steel clad plate with specially designed welded heat transfer fins, heated by the gas burner/combustion chamber. This combination delivers more uniform heat transfer over the entire cooking surface. The heavy plate prevents warping or distortion. (SEE OPERATOR'S MANUAL FOR PROPER WARM UP SETTINGS).

Controls and tilt mechanism are mounted in stainless steel housings, on the pan body sides. Braising pan shall come standard with a mounting bracket for either rightside, left- side or rear faucet mounting.

Etch marks included.

**Finish**

Interior of braising pan shall be polished to a 100 emery grit finish. Exterior of braising pan shall be finished to a bright semi-deluxe finish, ensuring maximum ease in cleaning and maintaining brilliant appearance.

**C.S.A. Design Certification**

Braising pan shall be design-certified by CSA International (formerly AGA) for use with Natural Gas or LP Gas.

**Sanitation and NSF Listing**

Braising pan shall be designed and constructed to be NSF- listed, meeting all known health department and sanitation codes. True rounded leg tubular design and 3" radius pan interiors make cleaning easier.

**Manual Tilt**

The braising pan shall have a smooth-action, quick-tilting body with manual crank tilt mechanism, which provides precise control during pouring of pan contents for easy operation. Pan body shall tilt past vertical to assist in cleaning.

**Vented Cover**

A heavy-gauge, fully-adjustable one-piece cover is standard

with torsion bar type counterbalance designed to maintain the selected cover position. A vent is provided in the cover top to regulate condensate buildup and a rear condensate drip shield is located under the cover to prevent condensate from dripping on floor when cover is opened.

#### **Controls**

Operating controls include console-mounted ON power switch, ON power indicator light, HEAT indicator light; plus right-side, rear-mounted thermostat control box.

#### **Performance Features**

Braising pan shall be equipped with controls that allow operation at 7 degree angle to facilitate griddling. Braising pan shall be thermostatically-controlled for automatic shutoff when desired temperature is reached and automatic power ON when temperature falls below desired setting. Each 40 Gallon Tilt Skillet has a firing rate of 144,000 BTU/hr. Electronic intermittent pilot ignition system is standard.

#### **ACCESSORIES**

Steamer Pan Carrier  
 2" tangent drawoff valve  
 48" Gas quick disconnect  
 Flanged feet  
 Strainer for tangent drawoff valve  
 Pouring lip strainer  
 Steamer pan inserts  
 Double Pantry Faucet with 48" spray hose assembly

Natural Gas: 144,000 BTU/hr each Skillet

Tilt Skillet and Accessories to be manufactured by, but not limited to, Groen Mfg., Jackson, MS. To be Model BPM-40G Tilt Skillet with Accessories as specified or approved equal.

#### **ITEM #55      RANGE, HEAVY DUTY**

Provide and install as shown one (1) only Heavy Duty Range with the following features:

To be natural gas fired 36" wide four-burner range with convection oven.

#### **SPECIFICATIONS**

36" wide heavy duty gas range. Modular construction for ease of installation. Stainless steel front, plate ledge, front top ledge with pull-out condiment rails, sides, base, stub back and 6" adjustable legs. Stainless steel extra deep crumb tray.

Four 35,000 BTU/hr. cast burners with lift-off burner heads.

Individual pilots and controls for each burner. Heavy duty cast burner grates, easy lift-off 11" x 17" in front, 14" x 17" in rear.

Grates are separate from aeration bowl for ease of cleaning.

Convection Oven: 32,000 BTU/hr. with porcelain oven bottom,

sides and interior door panel (115v-1 phase blower motor, 4 amps, 6' cord and plug). Oven measures 27"w x 27"d x 13"h. Convection oven adjusts from 175°F – 550°F  
 Convection oven with two racks. Oven allows for three rack positions. Oven door is heavy duty with counter weight door hinges. 1 1/4" diameter front gas manifold and 1 1/4" rear gas connection, capped. Total input 140,000 BTU/hr.

**STANDARD FEATURES**

Stainless steel front, front top ledge, burner box, sides, base, and stub back  
 1 1/4" diameter front gas manifold with 1 1/4" rear gas connection (capped)  
 35,000 BTU/hr. open top burners with lift off heads  
 32,000 BTU/hr. convection oven burner  
 Porcelain oven cavity  
 Individual pilots and controls for each burner  
 Heavy-duty cast grates  
 4" stainless steel stub riser  
 6" adjustable stainless steel legs  
 Universal rack guides  
 One year limited parts and labor warranty

**OPTIONS TO BE PROVIDED**

Cap and cover front manifold

**ACCESSORIES**

Provide appropriate size natural gas regulator  
 10" high back riser  
 Set of four (4) heavy duty 6" casters  
 Posi-Stops  
 48" flexible gas hose – quick disconnect and restraining device

Dimensions: 36" Wide x 41.85" Deep x 36" High  
 Natural Gas: 144,000 BTU/hr

Heavy Duty Range to be manufactured by, but not limited to, Vulcan Hart, Louisville, KY. To be Model V4B36C Range with Options and Accessories as specified or approved equal.

**ITEM #56      SPARE NUMBER**

**ITEM #57      VENT HOOD – IN MECHANICAL SECTION**

**ITEM #58      SPARE NUMBER**

**ITEM #59      MOBILE WARMING CABINET – EXISTING EQUIPMENT**

**ITEM #60 WORK TABLE WITH POT RACK – EXISTING EQUIPMENT****ITEM #61 TWO-COMPARTMENT SINK – EXISTING EQUIPMENT****ITEM #62 WORK TABLE – EXISTING EQUIPMENT****ITEM#63 SPARE NUMBER****ITEM #64 SLICER – EXISTING EQUIPMENT****ITEM #65 WORK TABLE – EXISTING EQUIPMENT****ITEM #66 FOOD CHOPPER – EXISTING EQUIPMENT****ITEM #67 SPARE NUMBER****ITEM #68 UTILITY CART, 2 – EXISTING EQUIPMENT****ITEM #69 DRY STORAGE SHELVING**

Provide and install as shown Dry Storage Shelving with the following features:

Quick-to-adjust, corrosion resistant shelving constructed of removable polymer open grid shelf mats, wire shelf frames, and corner releases. Shelf frames have an epoxy coating over an electroplated substrate and lift-off plastic shelf mats. Shelves offer a 20 year warranty against corrosion. Rust proof polymer posts offer a lifetime warranty against corrosion. Shelf mats and posts have built-in Microban® antimicrobial product protection. Rigid four-sided shelf frame and welded corners provide complete 360° capture of the wedge and post to ensure stability, strength and structural integrity. Each Starter and Add-on unit has a maximum capacity of 2,000 lbs. (907kg) evenly distributed. Units assemble easily — Shelves mount on four one-piece wedges along grooved, numbered posts. Shelves adjust on 1" (25mm) increments.

Each Dry Storage Shelving Rack to have four shelves and four 74" high polymer posts.

Dry Storage Shelving to consist of two (2) only 24" x 54" racks, three (3) only 24" x 60" rack, and one (1) only 24" x 72" rack.

Dry Storage Shelving to be manufactured by, but not limited to, InterMetro Industries, Wilkes Barre, PA. To be MetroMax Q shelving rack as specified or approved equal.

**ITEM #70      DRY STORAGE DUNNAGE RACKS**

Provide and install where shown, Dry Storage Dunnage Racks with the following features:

Dunnage Racks to be of polyethylene construction. To have slotted tops for air circulation. All rack edges to have generous radius to prevent product snagging or marking. Each rack to have weight capacity of 1500-lbs. Rack height to be 12". Each rack to be provide with two (2) separate interlocking keys for joining in end-to-end or back-to-back configurations. Joining system keys to drop in and be removable without the use of tools. Racks to be NSF approved.

Dry Storage Dunnage to be manufactured by, but not limited to, InterMetro Industries Corporation, Wilkes-Barre, PA or Eagle Group, Foodservice Equipment Division, Clayton, DE. To be Two (2) only Metro Model HP2230PD racks or approved equal.  
(Metro Model used for reference only).

**ITEM #71      CAN RACK**

Provide and install where shown one (1) only Can Rack with the following features:

Can Rack to be constructed of high strength extruded aluminum. Type 6063-T5 alloy. To have self feeding, gravity-fed front loading can slides. Slides are 1" x 2" extruded aluminum angle heli-arc welded to frame with the front edge rolled up to prevent cans from falling. Vertical and horizontal frame sections are 1-1/2" extruded aluminum tubing.

Rack to hold 13 #10 cans per set of runners providing a total capacity of 156 #10 cans.  
Dimensions: 27" wide x 44" deep x 76" high.

Can Rack to be manufactured by, but not limited to, New Age Industrial Corporation, Incorporated, Norton, KS. To be Model 97294 or prior approved equal.

**ITEM #72      REEL RINSE, CONTROL BOX**

Provide for PC to install where shown one (1) each water Control Box with the following features:

To be in-wall Reel Rinse Control Box Assembly.

To have 1/2" NPT female unions.

**KEY FEATURES**

- Temperature adjusting valve
- Thermometer
- Shut-off valve
- In-line backflow preventer
- Padlock hasp on door
- Stainless Steel frame for recessed mounting

**SYSTEM LIMITS**

- Temp: 40 degrees F MIN to 140 degrees F MAX
- Pressure 200 PSI MAX. Static

Provide Vacuum Breaker

Reel Rinse Control Box to be manufactured by, but not limited to, Fisher Mfg., Tulare, CA. To be one (1) each Model 1801 as specified or prior approved equal.  
Model 14540 Vacuum Breaker or approved equal.

### **ITEM #73      HOSE REEL WITH GUN**

Provide and install where shown one (1) only Hose Reel with Gun with the following features:

Hose Reel to have a 50' length, 5/8"ID high temperature hose. Reel to be enclosed design with stainless steel construction. To have a guide arm adjustable to 9 positions with ratchet lock and easy tension adjust and to have a stainless steel fluid path. To come with a stainless steel spray gun with waterproof nylon cover with ergonomic design and locking trigger mechanism. To have 7.0 gpm flow rate at 80 PSI. Temperature limits to be 40 degree minimum and 140 degree F maximum.

Hose Reel to be manufactured by, but not limited to, Fisher Manufacturing Company, Tulare, CA . To be One (1) each Fisher Model 29262 Reel Rinse with Gun or approved equal.

### **ITEM #74      AIR CURTAIN**

Provide and install where shown (above door casing), one (1) only Air Curtain with the following features:

To be unheated, above the door frame mounted, plunger activated Air Curtain.

#### **STANDARD CONSTRUCTION**

- 12 ¼" high x 21 ¼" deep
- 1/2 hp ten speed motor(s)
- Factory installed Intelliswitch digital controller
- Clear satin anodized aluminum exterior
- Wall & Top Mounting
- High efficiency, low noise Pro-V Nozzle

Electrical: 230v, 1Ph

#### **ACCESSORIES**

- Provide with Filter (washable)
- Provide Plunger style automatic door switch
- Provide 6" standoff wall mount

Air Curtain, Unheated to be manufactured by, but not limited to, Berner International, New Castle, PA. To be one (1) only Model AHD10-2072A Air Curtain and Accessories as specified or approved equal.

### **ITEM #75      UTILITY FAUCET – IN MECHANICAL SECTION**

### **ITEM #76      ICE MAKER – ICE/WATER DISPENSER**

Provide and install as shown one (1) each combination Ice Maker – Ice & Water Dispensers with the



following features:

Unit to be countertop nugget style Ice Maker and Dispenser for ice and water.

- Bite-sized nugget boasts 85% ice content\* with only 15% water offering one of the best nugget ratios for maximum cooling and minimal drink dilution.
- Up to 315 lbs. (143 kgs) standard daily ice production including ice and water content.
- DuraTech™ front panel for easy cleaning and reduced hard water staining in the dispense area.
- Only 16.25" (41.28 cm) wide by 24.00" (61.00 cm) deep by 35.00" (89.00 cm) tall on the RNS12 and 42.00" (107.00 cm) tall without legs.
- Trouble-free ice dispensing. Simply place cup under chute and activate.
- Two ice activation options: activation arm or touchless.
- Dispense opening (10.50"/ 26.67 cm) from grate to chute maximizes clearance for tall containers.
- Larger drain pan minimizes ice spillage.
- Blue LED light provides dispense visibility for rooms with limited ambient light.
- Drain connections in back or bottom of unit for flush mounting.

#### Accessories

Provide set of legs for each Unit

Electrical: 115v, 1Ph, 10.3 amps. Factory pre-wired with a 6' power cord and NEMA 5-15P plug

Provide and install as shown one (1) each Water Filters with the following features:

- Water Filter to reduce water-related ice machine problems caused by scale build-up from dirt and dissolved minerals.
- Improved filter media inhibits the growth of bacteria.
- Reduces chlorine taste and odor and other offensive contaminants.
- Self-contained scale inhibitor feed keeps ice machines functioning at full capacity.
- Reduces maintenance and service costs by reducing scale and clogging of distribution lines, evaporator plate and pump.
- Precoat submicron technology reduces dirt and particles as small as ½ micron in size and reduces possible health contaminants such as cysts.
- NSF Certified under NSF/ANSI Standards 42 and 53.
- Provided with wall mounting bracket.
- Rated Capacity: 9,000 gallons
- Provide one (1) extra replacement filter cartridge.

Ice Maker – Ice & Water Dispenser to be manufactured by, but not limited to, Manitowoc Ice, Manitowoc, WI. To be Model CNF0202 Ice Maker/Dispensers with Accessories as specified or approved equal.

Water Filter System to be manufactured by, but not limited to, Everpure, LLC, Hanover Park, IL. To be Model EV9324-01Insurice Single – i2000(2) System with Model EV9612-22

#### **ITEM #77 TABLE, STAINLESS STEEL**

Provide and install as shown one (1) only Stainless Steel Table with the following features:

Table to be 30" wide x 96" long x 34-1/2" to 35-1/2" adjustable working height.  
Top to be 14 gauge type 304 stainless-steel. Stainless steel hat channels.

Provide sound deadening (see section 2.07, C (2) of these documents).

Top to include 8" high backsplash with 1" turn at 90 degrees.

Table to have welded undershelf. Undershelf to be constructed of 18 gauge type 304 stainless-steel, located 10" above finished floor.

Legs to be 1-5/8" O. D., 16/304 tubular stainless-steel, stainless-steel gussets, stainless steel adjustable bullet feet.

Stainless Steel Table to be manufactured by, but not limited to, approved Fabricator in section 1.09, C of these documents or prior approved equal.

## SECTION 200010 - MECHANICAL GENERAL PROVISIONS

## PART 1 GENERAL

## 1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

## 1.2 MECHANICAL SPECIFICATION SECTION INDEX

*Division 20 – Fire Protection, Plumbing and HVAC General Provisions*

Section 200010 – Mechanical General Provisions

Section 200020 – Basic Mechanical Requirements

Section 200030 – Mechanical Submittals and Shop Drawings

Section 200035 – Mechanical Systems and Equipment Warranties

Section 200040 – Mechanical Close-out Requirements

Section 200050 – Basic Mechanical Materials and Methods

Section 200060 – Pipes and Pipe Fittings

Section 200100 – Valves

Section 200120 – Piping Specialties

Section 200140 – Supports and Anchors

Section 200170 – Electrical Requirements

Section 200190 – Mechanical Identification

Section 200240 – Mechanical Sound and Vibration Control

Section 200250 – Mechanical Insulation

*Division 22 – Plumbing*

Section 220430 – Plumbing Specialties

Section 220440 – Plumbing Fixtures, Trim and Accessories

Section 220450 – Domestic Water Heaters and Accessories

*Division 23 – Heating, Ventilating and Air Conditioning (HVAC)*

Section 230670 – Packaged Air Conditioners

Section 230830 – Heating/Cooling Terminal Units

Section 230860 – Fans

Section 230870 – Kitchen Supply and Exhaust Hood Systems

Section 230885 – Air Cleaning/Treatment

Section 230890 – Ductwork

Section 230910 – Ductwork Accessories

Section 230980 – Controls and Instrumentation

Section 230990 – Testing, Adjusting and Balancing

## 1.3 DEFINITIONS

- A. ARCHITECT: Architectural Design firm or ARCHITECT OF RECORD, meaning general building designer whose professional seal appears on the majority of general construction Contract Documents, or their authorized representative.
- B. ENGINEER (ENGINEER-OF-RECORD): ENGINEER whose professional stamp appears on Contract Drawings, etc. In general, unless specifically denoted otherwise, ENGINEER-OF-RECORD in Division 20, 22 and 23 Specification Sections denotes MECHANICAL ENGINEER-OF-RECORD.
- C. Exposed, or exposed to view: Those installations which can be seen, in whole or

part.

- D. Finished Spaces: Inside the building extents.
- E. Inspect and/or Inspection: Utilized for the PROFESSIONAL'S construction period services and defines as "visits by the PROFESSIONAL to the Project at appropriate intervals during construction to become generally familiar with the progress and quality of the CONTRACTOR'S work and to determine if the work is proceeding in accordance with the Contract Documents."
- F. Outside: Synonymous with outdoors, outside of building, exposed to weather, etc.
- G. Plans: Denotes general Construction Drawings prepared by the A/E.
- H. PROFESSIONAL: Authorized representative of ENGINEER-OF-RECORD'S firm.
- I. Provide: Unless specifically denoted otherwise, the CONTRACTOR referred to shall be responsible for furnishing, providing, installing, connecting, and making item or system fully functional in a safe manner as recommended by the manufacturer and by Industry Standards.

#### 1.4 APPLICABLE STANDARDS

- A. The intent is that the complete installation shall comply with applicable laws and ordinances, utility company regulations, and applicable requirements from the latest edition of the following:

ANSI	American National Standard Institute
ASHRAE	ASHRAE guides, Latest Editions
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing Materials
ICC	International Code Congress
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
UL	Underwriters Laboratories

Gautier, Mississippi, Fire, Building, Gas, Plumbing and Mechanical Codes and Regulations, and governing authority having jurisdiction.

- B. Other applicable building, safety or fire codes having jurisdiction over equipment, materials or methods. The decision of the ENGINEER will be final in event of dispute over Code to use or its interpretation.

#### 1.5 GENERAL CONDITIONS

- A. The General Conditions, Information to Bidders, Special Conditions, and other pertinent documents issued by the ARCHITECT are a part of these Specifications and shall be complied with in every respect.
- B. By the act of submitting a bid, this CONTRACTOR agrees that all of the Contract Documents and each of the divisions of the complete Specifications have been reviewed and studied, and all requirements and coordination resulting there from are included.

- C. This CONTRACTOR shall conform to standards prescribed by City, County, and State regulations or ordinances having jurisdiction. Any changes that may be necessary to conform to such regulations or ordinances shall be made by this CONTRACTOR without extra costs to the OWNER. Where code requirements are less than those shown on the Plans or in the Specifications, the Plans and Specifications shall be followed. Where applicable, NFPA requirements shall be met.
- D. The CONTRACTOR shall comply with all applicable provisions of the William-Steiger Occupational Safety and Health Act (O.S.H.A.).
- E. Permits required for the installation of the work, as well as all authorized code inspections, including all fees and assessments, shall be borne by and arranged for by the CONTRACTOR. The CONTRACTOR shall verify specific mechanical related provisions for permitting in advance, especially where additional design/installation documentation may be required, and include provisions and/or cost of same in this bid.
- F. This CONTRACTOR shall provide all items, articles, materials, operations or methods listed, mentioned, or scheduled on the Drawings and/or herein including all labor, materials, equipment and incidentals necessary, required or implied, for the completion of the various systems.

#### 1.6 EXPLANATION AND PRECEDENCE OF DRAWINGS

- A. For purposes of clearness and legibility, Drawings are essentially diagrammatic and, although size and location of equipment are drawn to scale whenever possible, the CONTRACTOR shall make use of all data in the contract documents and shall verify this information at building site.
- B. Do not scale drawings having 1/4" or smaller scale. The Drawings indicate required size and points of termination of pipes and ducts, and suggest proper routes of pipe to conform to structure, avoid obstructions and preserve clearances. Because of small scale, it is not intended that Drawings indicate all necessary offsets, and it shall be the work of this Section to install work in such a manner as to conform to structure, avoid obstructions, preserve headroom and keep openings and passageways clear without further instruction or cost to the OWNER.
- C. It is intended that all apparatus be located symmetrically with architectural elements, and shall be installed at exact height and locations as shown on the Architectural Drawings.
- D. The CONTRACTOR shall be solely responsible for taking his own measurements and installing his work to suit conditions encountered.

#### 1.7 SPECIAL CONDITIONS, MECHANICAL

- A. The right is reserved to move any element as much as ten (10') feet at no increase in cost provided CONTRACTOR is notified before work in question is fabricated or installed.
- B. The CONTRACTOR shall fully inform himself regarding any and all peculiarities and limitations of spaces available for the installation of all work and materials furnished and installed under the contract. He shall exercise due and particular caution to determine that all parts of his work are made quickly and easily accessible. The CONTRACTOR shall be guided by the architectural details and conditions existing at the job, correlating this work with that of the other trades, and report to the

OWNER any discrepancies or interferences that are discovered. Failure to report such discrepancies and interferences shall result in the correcting of these errors or omissions by the CONTRACTOR at his own expense. All work which deviates from the Drawings and Specifications without prior approval of the OWNER, shall be altered by the CONTRACTOR at his own expense to comply with the Drawings and Specifications as directed.

- C. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.
- D. The CONTRACTOR shall coordinate his work with that of the OWNER, in order that there will be no delay in the proper installation and completion of the work. If, in the opinion of the OWNER, any piping, equipment, etc., has been improperly placed or installed due to lack of coordination with the other trades, such piping and equipment shall be relocated as directed by the OWNER at the CONTRACTOR'S expense.

## 1.8 SITE SAFETY

CONSULTANT'S site responsibilities are limited solely to the activities of CONSULTANT and CONSULTANT'S employees on site. These responsibilities shall not be inferred by any party to mean that CONSULTANT has responsibility for site safety. Safety in, on, or about the site is the sole and exclusive responsibility of the CONTRACTOR alone. The CONTRACTOR'S methods of work performance, superintendence of the CONTRACTOR'S employees and sequencing of construction are also the sole and exclusive responsibilities of the CONTRACTOR alone. The CONTRACTOR shall, to the fullest extent permitted by law, waive any claim against CONSULTANT and his employees and indemnify, defend, and hold CONSULTANT harmless from any claim or liability for injury or loss arising from CONSULTANT'S alleged failure to exercise site safety responsibility. The CONTRACTOR also shall compensate CONSULTANT for any time spent or expenses incurred by CONSULTANT in defense of any such claim. Such compensation shall be based upon CONSULTANT'S prevailing fee schedule and expense reimbursement policy. The term "any claim" used in this provision means "any claim in contract, tort or statute alleging negligence, errors, omissions, strict liability, statutory liability, breach of contract, breach of warranty, negligent misrepresentation, or other acts giving rise to liability.

## PART 2 – PRODUCTS – NOT APPLICABLE

## PART 3 – EXECUTION

### 3.1 WORKMANSHIP, MATERIALS AND EQUIPMENT

- A. All work shall be performed in a workmanlike manner and shall present a neat and mechanical appearance when completed. All materials shall be of type, quality and minimum rating prescribed herein or indicated on the Contract Drawings.
- B. If equipment or fixtures to be furnished by OWNER and/or OWNER'S vendor are not delivered prior to final acceptance, services shall be capped or plugged at walls or floor as directed by ARCHITECT, ready for future connection.

### 3.2 CLEAN-UP

- A. Do not allow mechanical related waste material or rubbish to accumulate in or about job site.
- B. At completion of work, remove all rubbish, tools, scaffolding and surplus materials

from and about building, leaving work clean and ready for use without further cleaning required. Clean all equipment, piping, valves, fixtures, and fittings of grease, metal cuttings, insulation cement, dust, dirt, paper labels, etc.

- C. Any discoloration or other damage to parts of building, its finish or furnishings due to failure to properly clean or keep clean mechanical systems shall be repaired without additional cost to OWNER.
- D. All equipment, fixtures and installations, especially where installations are exposed to view, shall be thoroughly cleaned, polished, seams smoothed and/or sealed for a neat appearance.

### 3.3 INSPECTION OF PROPOSED CONSTRUCTION

Prior to submitting his bid, the CONTRACTOR shall visit the site of the proposed construction and shall thoroughly acquaint himself with existing utilities, working conditions to be encountered, etc. No additional compensation shall be allowed for conditions increasing the CONTRACTOR'S cost which were not known or appreciated by him when submitting his proposal if the condition was obvious and could have been discovered by him if he had visited the project site and thoroughly informed himself of all existing conditions which would affect his work, including requirements of local authorities to meet their procedures, special requirements, codes, etc.

### 3.4 TEMPORARY ENVIRONMENTAL CONDITIONING

Temporary heating, cooling and dehumidification capability shall be provided for this project beginning a minimum of 90 days prior to the original contract scheduled substantial completion date and maintained until the OWNER'S final acceptance of the project, or any phase thereof. The beginning of this temporary HVAC period is intended to align with general industry standard construction practice of providing a minimum suitable indoor environment for the installation and curing of adhesives, finishes, wall covering(s), tile ceiling/floors, etc. It is highly dependent upon the CONTRACTOR's comprehensive project coordination and scheduling efforts and shall be lengthened (begun earlier) should the CONTRACTOR install such systems and/or finishes which are recommended by the system and/or finish manufacturer to be installed and/or maintained in a minimum environmental condition. This interior space conditioning, known hereafter as "temporary HVAC", includes all areas of the project where the space will be similarly conditioned with heating, cooling and/or dehumidification capability after the project or any portion/phase thereof is completed.

During this minimal temporary HVAC period, the interior space shall be continuously monitored and controlled to provide the following:

1. maximum 85 degrees Fahrenheit dry bulb temperature.
2. minimum 60 degrees Fahrenheit dry bulb temperature.
3. maximum 60% relative humidity.

In effect, automatic controls for refrigeration, dehumidification, and heating shall be provided such that the indoor building environment, as described above, can be continually maintained. If a system and/or finish manufacturer recommends a more stringent requirement for conditioning, same shall be provided.

CONTRACTOR may utilize temporary thermostats/sensors/controllers in conjunction with these temporary HVAC provisions. These temporary thermostats are not required to be the same grade unit specified herein, but rather intended to protect overall system performance

during construction periods. Less expensive thermostats/controllers are acceptable. Temporary thermostats/controllers should be replaced with specified units prior to beginning Testing, Adjusting and Balancing per Section *Controls and Instrumentation*.

The CONTRACTOR shall coordinate such temporary provisions with the all trades and utility companies to accomplish this requirement including adequate temporary power to equipment, etc. All cost and coordination for these temporary HVAC provisions shall be the responsibility of the CONTRACTOR and included in his base bid.

While operating the systems, the intent is to protect the installations from dirt, dust, debris, etc. such that at substantial completion the systems are new, clean and ready for the OWNER's beneficial use. The CONTRACTOR is responsible for protection of the WORK to meet the design intent identified herein. The following minimum requirements shall be met:

1. Completed manufacturer equipment start-up forms must be filled out completely for each and every piece of equipment. Copy of same shall be maintained on file at the project site for verification. Failure to complete the form entirely or maintain copy at project site will result in equipment operation being discontinued without exception.
2. The exterior building envelope is complete including installation of all permanent doors, windows, walls, louvers, roof openings, etc.
3. ALL interior and exterior dust generating activities and subsequent cleanup is complete and approved by the ARCHITECT. Examples of this are exterior sitework around the building, interior sheet rock installation/finishing, floor grinding, spray application of paints/sealers, etc.
4. HVAC Systems shall have pleated air filters of types indicated in Section Air Cleaning/Treatment installed, monitored and periodically replaced when loaded.
5. All R/A grilles and/or openings into ductwork/plenums are fully covered, and protected with filter material of types indicated in Section Air Cleaning/Treatment. These filters shall be continually monitored and periodically replaced when loaded.
6. There is no reduction in specified equipment warranty, capacity, performance, or life of the equipment.
7. HVAC equipment manufacturer's recommendations don't indicate construction practices and installations are harmful to systems, equipment, etc.
8. HVAC equipment manufacturer start-up tests have been performed and accompanying forms have been transmitted to Professional for review. See HVAC equipment specification sections for more information. A copy of same shall be included in Close-out Documents. See Section *MECHANICAL CLOSE-OUT REQUIREMENTS*.

If new HVAC equipment cannot be utilized for providing indoor environmental control during construction for finishes, etc., the CONTRACTOR shall arrange for other temporary HVAC capacity as required.

If the CONTRACTOR fails to adhere to these guidelines for operation of the permanent building mechanical systems, corrective action by the CONTRACTOR will be required. Corrective action will be determined by the ENGINEER but may include any combination of



the following:

1. Cleaning or Replacing Ductwork should it be found with visible dust/debris. A third-party testing/inspection representative may be required depending upon the extent of contamination.
2. Replacement or Cleaning of Equipment should it be found with visible dust/debris/damage. The respective equipment manufacturer's representative will be required to inspect and make written recommendations as to the corrective actions necessary to return the equipment to like new conditions.

The CONTRACTOR will be solely responsible for and include all cost associated with any required corrective actions.

However, permanent HVAC equipment, as described above, shall be fully operational during the last 30 days of the temporary HVAC period such that system performance and controls can be tested, adjusted and balanced per Section Testing, Adjusting and Balancing.

### 3.5 EXISTING UTILITIES AND SERVICES

- A. When encountered in work, protect existing active sewer, water, gas, electric, other utility services, structures; where required for proper execution of work, relocate them as directed. If existing active services are not indicated, contact PROFESSIONAL for instructions.
- B. When encountered in work area, whether or not indicated, cap or plug or otherwise discontinue existing inactive sewer, water, gas, electric, other utility service structures, of which action should be taken. If removal is required, request instructions from PROFESSIONAL.
- C. While work is in progress, except for designated short intervals during which connections are to be made, continuity of service shall be maintained to all existing utilities and systems. Interruptions shall be scheduled and coordinated with ARCHITECT and OWNER and approved in advance with the OWNER and serving utilities. If requested, downtime shall be limited to weekends and/or night periods to least disrupt normal use of these utilities. The CONTRACTOR shall be responsible for any interruptions to service and shall promptly repair any damages to existing systems caused by his operations.
- D. The accuracy of the location of existing underground, and otherwise concealed, HVAC, domestic, fire protection, sanitary and storm drainage utilities is not guaranteed. The CONTRACTOR shall, early in the project, prior to demolition of existing work and layout of new work, verify all underground and concealed work in the proximity of connections to existing services and routings.
- E. Immediately upon commencing construction, and prior to construction of any part of the facility involved in any way with utilities, the CONTRACTOR shall investigate thoroughly the size, capacity, arrangement and location of all mechanically related utilities. The CONTRACTOR shall immediately report any discrepancies or apparent problem involving the project that pertains to utilities. This applies to private as well as public utilities. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.

END OF SECTION



## SECTION 200020 - BASIC MECHANICAL REQUIREMENTS

### PART 1 – GENERAL

#### 1.1 SCOPE

Furnish all labor, materials, services, and equipment required to complete the installation of complete and acceptable mechanical systems in accordance with these specifications and the contract drawings.

#### 1.2 TESTS

- A. This CONTRACTOR shall conduct such tests as required to determine that systems and equipment, which he installs, conform to Specifications. CONTRACTOR shall supply all labor, materials, instruments, operations, etc., required to facilitate testing.
- B. Gauges, thermostats, and instruments used in testing shall be accurate, recently calibrated and approved by the PROFESSIONAL prior to test. Instruments installed permanently in systems as specified herein may be used in testing when approved by the ENGINEER.

### PART 2 – PRODUCTS – NOT APPLICABLE

### PART 3 – EXECUTION

#### 3.1 MISCELLANEOUS WORK REQUIRED

- A. The CONTRACTOR shall provide foundations for equipment, chases, furring, framed openings in wall, partitions, etc., installation of wall louvers and grilles in doors, finish painting and all other similar work of a general construction nature. All roof flashing by CONTRACTOR.
- B. The CONTRACTOR shall bring adequate power to and make final connections to all equipment furnished under this Contract.
- C. All items of labor, materials and equipment not specifically stated herein or on Contract Drawings to be by others are required to make the systems complete and operative, shall be by this CONTRACTOR.

#### 3.2 PROTECTION OF EQUIPMENT AND MATERIALS

- A. Responsibility for care and protection of equipment and materials under this Contract rests with this CONTRACTOR until equipment or materials have been tested and accepted.
- B. All pipe ends, valves, ductwork and parts of equipment left unconnected, permanently or temporary, shall be capped, plugged or properly protected at the end of each working day to prevent entry of foreign matter. During the construction process, cover ductwork exposed to weather and/or when not yet installed, with sheet metal caps screwed in place and sealed.
- C. Store equipment, ductwork including pipe and valves, off the ground and under cover. For storage outdoors, minimum 6-mil thick plastic shall be fitted to withstand splattering, ground water, precipitation and wind.
- D. Protect air handling unit coils by use of protective sheet metal panels or plywood.
- E. Damaged equipment shall be repaired or replaced at the option of the PROFESSIONAL. Finishes and/or scratched paint on equipment, etc., shall be repaired and repainted to match new condition(s).

- F. Do not bring insulated equipment or ductwork to job site until same can be adequately protected from wind, rain and damage, etc. In general, store ductwork in building(s) not yet fully enclosed, off the ground and under minimum 6-mil plastic sheeting, etc. This includes dual wall spiral and interior lined rectangular ductwork, and other similar equipment with liners, controls, etc., not recommended to be exposed to wind and water, etc. Such ductwork and equipment found damaged and/or damp shall be immediately replaced and shall not be utilized for this project.
- G. This CONTRACTOR shall protect his work at all times from danger by freezing, breakage, dirt, foreign materials, etc., and shall replace all work so damaged. The CONTRACTOR shall use every precaution to protect the work of others, and he will be held responsible for all damage to other work caused by his work or through the neglect of his workmen.

### 3.3 INSTALLATION COORDINATION

- A. The mechanical plans do not give exact elevations or locations of lines, nor do they show all the offsets, control lines, or other installation details. The CONTRACTOR shall carefully lay out his work at the site to conform to the structural conditions, to provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturers of the equipment to be installed, and to thereby provide an integrated, coordinated and satisfactory operating installation. In general ductwork has the right-of-way.
- B. If the CONTRACTOR proposes to install equipment, including piping and ductwork requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the ARCHITECT review the change before proceeding with the work. The request for such changes shall be accomplished by Shop Drawings of the space in question.
- C. The CONTRACTOR shall so coordinate the work of the several various trades that it may be installed in the most direct and workmanlike manner without hindering the other trades. Piping interferences shall be handled by giving precedence to pipe lines, which require a stated grade for proper operation. For example, sewer lines and condensate piping shall take precedence over water lines in determination of elevations. Where there is interference between sewer lines and condensate lines, the sewer lines shall have precedence and provisions shall be made in the condensate lines for looping them around the sewer lines. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- D. Piping, equipment, or ductwork shall not be installed in electrical equipment rooms or elevator machine rooms except as serving only those rooms. Outside of electrical equipment rooms, do not run piping or ductwork, or locate equipment, with respect to switchboards, panel boards, power panels, motor control centers or dry type transformers:
  - 1. Within 42" in front (and rear if free standing) of equipment; or
  - 2. Within 36" of sides of equipment.
  - 3. Clearances apply vertically from floor to structure/ceiling.

### 3.4 INSTALLATION DIRECTIONS

Obtain manufacturer's printed installation directions to aid in properly executing work on equipment requiring such directions. Submit such directions and installation details to

PROFESSIONAL for approval prior to time of installation for use in supervising work. If the manufacturer's installation instructions or details conflict with the Contract Document requirements, CONTRACTOR shall promptly make PROFESSIONAL aware in writing and request clarification.

### 3.5 MECHANICAL VERIFICATION AND INSPECTIONS

- A. The CONTRACTOR shall coordinate, with the A/E with a minimum ten (10) days advance notice, the inspection of mechanical sub-systems for the following:
  - 1. in-wall piping/ductwork
  - 2. above ceiling piping/ductwork
- B. These inspections shall be coordinated prior to wall and/or ceiling/attic insulation installation, (concealment) etc., such that these mechanical installations can be easily visually inspected by A/E for general conformance with Contract requirements. These installations shall not be concealed until such time the A/E indicates these mechanical installations are acceptable. If a re-inspection is required, an A/E revisit and a follow-up inspection shall be similarly coordinated with sufficient advance notice as approved by the A/E. Therefore, it is pertinent for the CONTRACTOR to inspect these type installations himself and verify that these installations are complete and in conformance with specified standards to minimize any time delays and/or coordination of construction sequencing, etc.
- C. The CONTRACTOR should note the following requirement for administering the punch list(s) and mechanical closeout documents associated with a substantial completion and/or final, etc.
- D. In general, the punch list(s) will be furnished with blanks for the CONTRACTOR and/or his Sub-Contractor(s) to initial and date, adjacent to each item, for coordination and verification efforts. The completed punch list shall be transmitted to A/E to allow them to thereafter schedule a follow-up visit for re-inspection and verification. It is, therefore, prudent for the CONTRACTOR, to administer the overall process, and verify that all punch list items are complete and in compliance with Contract requirements, prior to requesting a follow-up A/E inspection effort.
- E. The CONTRACTOR shall be liable for inspections and further administrative involvement required of the A/E after 30 days of the original scheduled completion date, and for re-inspections and involvement by the A/E caused by the CONTRACTOR'S negligence and failure to fully complete punch lists and Closeout Documents when required and/or requested.

END OF SECTION



## SECTION 200030 - MECHANICAL SUBMITTALS AND SHOP DRAWINGS

## PART 1 – GENERAL

## 1.1 SUBMITTALS AND SHOP DRAWINGS

- A. The submittal data to be furnished for this project shall comply with the Specifications and Contract Documents in their entirety. See *Division 01* for more information.
- B. Reproduction of design documents in any portion for use in a submittal is not acceptable.
- C. Provide all additional documentation required to obtain permanent permit for this project as may be required by Authorities Having Jurisdiction. All such additional documentation shall be considered a normal part of the shop drawing with the cost of same included.
- D. Selection of Materials and Equipment:
  - 1. Where a definite material or brand name is specified, it is not the intent to discriminate against any product of another manufacturer. Reference to a specific manufacturer's product by name, make or catalog number is intended to establish standards of quality, design, dimensions and appearance.
  - 2. Open competition is expected, but in all cases, complete data must be submitted for comparison and test when requested by the PROFESSIONAL. Burden of "proof of equality" lies solely with the CONTRACTOR.
  - 3. The products of various manufacturers have been used as the basis of design in preparation of these documents. It shall be the responsibility of the CONTRACTOR to ensure the submitted materials and equipment will fit into the space allotted. Furthermore, verify and maintain adequate access to equipment, valves, filters, lubrication outlets, etc. Any changes to the building or system design necessary shall be arranged for in writing before the materials and equipment is ordered. All costs involved in making such changes shall be borne by the CONTRACTOR.
  - 4. When submitting materials and equipment other than the basis of design, note the following minimum considerations:
    - a. Capacities shown are absolute minimum and must be equaled
    - b. Physical size, weight, etc. limitations
    - c. Noise and vibration levels
    - d. Interchangeability
    - e. Accessibility for maintenance and replacement
    - f. Compatibility with other materials, assemblies
    - g. Similar items shall be furnished by the same manufacturer and style whenever possible.
  - 5. The availability of service is of prime importance to the OWNER and was a major consideration in selecting the materials and equipment that are listed as the basis for design. Competent service must not only be available, but

must, in the case of specialty HVAC equipment and control systems, be a direct arm of the manufacturer. Further, the service agency, as a representative of this manufacturer, must have been in continuous operation in this area sufficient time to indicate a degree of permanence.

## 1.2 SAMPLES AND MOCK-UPS OF PROPOSED INSTALLATION

### A. Samples:

1. Provide samples of equipment, components, control devices, etc. as requested by the PROFESSIONAL.
2. These samples are intended to demonstrate quality of construction of proposed installation materials and/or equipment.
3. In general, each substitution request made by the CONTRACTOR will likely require a sample be furnished for review. However, in some cases, samples will be requested of specified equipment, components, control devices, etc. to demonstrate to the Owner the proposed installations.

### B. Mock-ups:

1. Provide mock-ups of the proposed installations as requested by the PROFESSIONAL.
2. These mock-ups shall be either in-place or separately constructed at the direction of the PROFESSIONAL.
3. In general, mock-ups shall be of completed proposed installations as coordinated between CONTRACTOR and PROFESSIONAL. In some cases, this will require different levels of completion or staged mock-up construction (i.e. ductwork with taps installed and sealant applied in one section without insulation and insulation applied in another). Some examples of these mock-ups are as follows:
  - a. Rooftop and pad mounted equipment
  - b. Rooftop piping support
  - c. Ductwork including rectangular interior lined and exterior wrapped with round taps and run-outs
  - d. Plumbing fixture(s)
  - e. Trapeze piping installation including valves, fittings, insulation and saddles

## PART 2 – PRODUCTS – NOT APPLICABLE

## PART 3 – EXECUTION

### 3.1 SUBMITTALS AND SHOP DRAWINGS

- A. The following product data submittals for materials and equipment shall be submitted to PROFESSIONAL for approval:
  1. SECTION *PIPE AND PIPE FITTINGS*
    - a. Sanitary Waste and Vent Piping Fittings and Connections
    - b. Condensate Drain Piping Fittings and Connections



- c. Domestic Water Piping Fittings and Connections
  - d. Gas Piping Fittings and Connections
  - e. Refrigerant Piping Fittings and Connections
  - f. Equipment Utility and Relief Drain Piping Fittings and Connections
  - g. Grease Waste Piping Fittings and Connections
2. SECTION *VALVES*
- a. Manual "Circuit-Setter" Balancing Valves
  - b. Ball Valves
  - c. Gas Valves
  - d. Check Valves
3. SECTION *PIPING SPECIALTIES*
- a. Pressure Gauges
  - b. Heat Tape for Kitchen Walk-in Freezer Drain Applications
  - c. Thermometers
4. SECTION *MECHANICAL IDENTIFICATION*
- a. List and Size/Color(s) of all Starter, Switch, Disconnect Switch, Time clock and Equipment and Warning Phenolic Labels
  - b. Piping Markers
  - c. Underground Tracer Identification Tape
5. SECTION *MECHANICAL SOUND AND VIBRATION CONTROL*
- a. Pipe, Duct and Equipment Vibration Isolation
6. SECTION *MECHANICAL INSULATION*
- a. Insulation for all piping applications
  - b. Insulation for all ductwork applications
  - c. Piping fitting insulation and cover
7. SECTION *PLUMBING SPECIALTIES*
- a. Cleanouts
  - b. Floor Drains
8. SECTION *PLUMBING FIXTURES, TRIM & ACCESSORIES*
- a. Plumbing Fixtures and Trim
  - b. Carriers
  - c. Handicapped Drain/Water Supply Insulation Protectors
  - d. Hose Bibbs
  - e. Water Hammer Arrestors
  - f. Grease Interceptor

9. SECTION *DOMESTIC WATER HEATERS AND ACCESSORIES*
  - a. Water Heaters and Installation Accessories
  - b. Potable Water Expansion Tanks
  - c. Mixing Valves
  - d. Re-circulating Pumps
10. SECTION *PACKAGED AIR CONDITIONERS*
  - a. Self-Contained Package Units
  - b. Thermostats, Humidistats and Protective Covers
11. SECTION *HEATING/COOLING TERMINAL UNITS*
  - a. Wall Heaters
12. SECTION *FANS*
  - a. All Fans, Construction, Accessories, and Finishes
  - b. Submit Fan and Curb Housing Color Chart for ARCHITECT Color Selection
13. SECTION *KITCHEN SUPPLY AND EXHAUST HOOD SYSTEMS*
  - a. Kitchen Hood and Accessories
  - b. Kitchen Hood Supply Fan and Pre-Heater
  - c. Hood Fire Suppression System and Cabinet
14. SECTION *AIR CLEANING/TREATMENT*
  - a. Air Filters for Construction Period and Spares for Permanent use.
15. SECTION *DUCTWORK*
  - a. Round to Rectangular Duct Adapters (Bell mouth)
  - b. Joint Sealant
  - c. Flexible Duct
16. SECTION *DUCTWORK ACCESSORIES*
  - a. Duct Access Doors
  - b. Volume Dampers
  - c. Backdraft Dampers
  - d. Air Distribution Devices
  - e. Brick Vents with Screen Data
17. SECTION *CONTROLS AND INSTRUMENTATION*
  - a. Control Devices
  - b. Relays
  - c. Local Temperature Relay Panel & Labeling
  - d. Wiring Diagrams and Shop Drawings

- e. Sequence of Operation
  - f. Thermostat and Humidistat and Covers
18. SECTION *TESTING, ADJUSTING AND BALANCING*
- a. Testing, Adjusting and Balancing Agency, Certification Credentials, Sample Forms, Instrument List with Calibration History.
  - b. TAB Report – Preliminary with certification of mechanical systems safety and operating controls. Note: Submittal must be transmitted to the Professional 5 days prior to request for substantial completion inspection.

END OF SECTION



## SECTION 200035 - MECHANICAL SYSTEMS AND EQUIPMENT WARRANTIES

## PART 1 – GENERAL

## 1.1 SCOPE

Furnish all labor, materials, services, and equipment warranties as outlined herein for mechanical systems and equipment.

## 1.2 GUARANTEE AND WARRANTY

A. See Division 01 for warranty start date.

B. INDUSTRY STANDARD GUARANTEE:

See Architectural Specifications.

C. Test Period:

Each piece of equipment shall meet performance specifications after three months' actual operation to OWNER'S satisfaction.

D. CONTRACTOR shall replace, or make good, any defect due to faulty workmanship or material, which shall develop within one year from the beginning of the warranty period. This guaranty shall cover both material and labor. Leaking pipe work is considered faulty workmanship. This warranty shall include repair, removal of defective parts and installation of replacements. The CONTRACTOR shall also be responsible for property damage that results from defects in materials, improper controls or setup, and/or installation during the warranty period.

E. For first year after the warranty begins, CONTRACTOR shall provide, at no cost to the OWNER, any required maintenance and service necessary to assure the proper operation of the installations and systems. Latent defects arising during this period shall, upon notification by the OWNER, be promptly corrected at no additional cost to the OWNER. This shall include:

1. Refrigerant and Oil Replacement in Refrigeration Systems: Leaking refrigerant systems shall be repaired, proved tight, and charged with manufacturer's recommended refrigerant and lubricant, within any standard warranty period.
2. Any adjustments and service required, excluding filter monitoring and replacement.
3. Any necessary adjustments in system control set points when required, excluding filter monitoring.

F. The CONTRACTOR shall make inspections at end of 6th and 11th months after beginning of warranty related to the HVAC control system. During these inspections, the CONTRACTOR shall verify all control settings and recalibrate controls and sensors to match requirements as can be coordinated with PROFESSIONAL based on historical trend by data and to optimize system performance. Temperature and safety controls shall be adjusted as necessary to insure continuous, trouble free, safe, and automatic operation of systems including gas burner, refrigerating equipment, etc.

G. Extended Equipment Warranties

1. Definitions and General Requirements

- a. Extended warranties, defined as a warranty after the standard one (1) year warranty.
- b. "Comprehensive" is defined as a complete warranty except for acts of God and negligent maintenance or operation of the specified equipment as required of the OWNER.
- c. All comprehensive equipment warranties shall include all parts, labor, shipping, postage, freight, handling fees, etc., to accomplish any repair and/or replacement at no additional cost to OWNER. These warranty provisions will be binding on any CONTRACTOR and/or supplier/manufacturee unless specifically approved otherwise in writing by OWNER.
- d. Lack of specific action on any manufacturer's, supplier, and/or CONTRACTOR submitted alternate warranty shall not be construed as approval of same and shall not void the manufacturer and/or CONTRACTOR'S contractual obligation to provide specified warranty.
- e. Third party insurance and/or split CONTRACTOR labor/manufacturee's equipment/material warranties shall not be acceptable. Only manufacturer's comprehensive warranties shall be acceptable.

2. Extended Warranties Required

- a. Section *Packaged Air Conditioners* – 4 years compressor parts only non-prorated.

PART 2 – PRODUCTS – NOT APPLICABLE

PART 3 – EXECUTION

3.1 GUARANTEE AND WARRANTY

All certificates shall first be presented to the ARCHITECT for approval. After approval, copies of the certification(s) shall be forwarded to the OWNER by the CONTRACTOR.

END OF SECTION

## SECTION 200040 - MECHANICAL CLOSE-OUT REQUIREMENTS

### PART 1 – GENERAL – NOT APPLICABLE

### PART 2 – PRODUCTS – NOT APPLICABLE

### PART 3 – EXECUTION

#### 3.1 AS BUILT DRAWINGS

Project Record Documents and As Built Drawings:

- A. Maintain at job site a set of contract record documents kept current by indicating thereon all changes, substitutions, etc., between work as specified and as installed.
- B. Show on record documents actual air quantities, water flow rates, valve or damper positions after balancing, etc.; also show, by actual dimension, location of all new and known existing underground work.
- C. At the completion of the project, furnish the OWNER three (3) set(s) of bluelines and three (3) complete, clean sets of specifications showing installed location, size, etc., of all work and material as taken from record documents. All as-built (on record) drawings shall be labeled "As-Built Drawings," dated and certified accurate by CONTRACTOR with his signature, on front page of all Drawing Blueline sets and Specifications.

#### 3.2 OPERATION AND MAINTENANCE MANUALS

- A. Submit three (3) complete sets of bound brochures in 8-1/2" x 11" spring post binders, indexed and tabled by equipment type (Air Handler, Plumbing Fixtures, etc.).
- B. Include in these brochures written submittal data, manufacturers operating and maintenance procedures and recommendations, spare parts lists and suppliers and any interlocking control or wiring diagrams for all equipment. The information listed herein is to be bound in the following order:
  1. First sheet to list ARCHITECT, ENGINEER, CONTRACTOR and Sub-Contractors with addresses for each.
  2. Second sheet to list type of equipment with sequential number, the manufacturer, make, model and serial number of the actual equipment nameplate data rated horsepower, full load rated amps, voltage and phase.
  3. Next, actual copy of approved submittal data including all manufacturers published information on capacities, capacity curves or tables, accessory and control item lists, and other pertinent information as requested by ENGINEER. Cross-reference all equipment to Contract Documents.
  4. Next, copy of all spare parts list and suppliers' contact information.
  5. Next, include the manufacturer's published operating and maintenance procedures.
    - a. Include instructions to stop and start each piece of equipment including reference to controls and interlocks and an itemized maintenance schedule detailing procedure and interval of periodic maintenance items. Start this log of the maintenance list(s) by accomplishing the initial required maintenance procedure(s) for each and every maintenance item.

- b. Operating instructions shall also include recommended periodic maintenance and seasonal changeover procedures, and suggested procedures in operation of all systems in this particular building to promote energy conservation. These instructions must be written expressly for this project and shall refer to equipment, valves, etc., by mark number from project schedules. Operating instructions and procedures shall be submitted in draft form, for approval prior to final issue of complete brochures. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instructions. Bulletins shall be clearly marked for the equipment furnished. Where a bulletin contains more information than that for the installed equipment, such extended information shall be deleted by crossing it out or by stripping it from the bulletin.
6. All system operating instructions that were earlier approved by PROFESSIONAL and utilized for OWNER personnel education shall also be inserted herein.
- C. This bound information will require the PROFESSIONAL'S signed approval before this contract is complete. No exceptions will be granted.
- D. A copy of HVAC and Plumbing equipment, and sprinkler system operation and maintenance (O & M) Manufacturer's recommended brochures shall be transmitted to the TAB Agent within ninety (90) days after Notice to Proceed such that TAB Agent shall utilize same in preparation of Owner's Personnel Education/Agenda.
- E. The manuals shall be previously approved by the PROFESSIONAL and transmitted to the OWNER at least one week prior to the final inspection.

### 3.3 OWNER EDUCATION

- A. OWNER Representative Education and Operating and Maintenance instructions
  1. During the last phase of the project, the CONTRACTOR, in conjunction with the applicable SUB-CONTRACTORS shall coordinate and facilitate the start-up, Testing, Adjusting and Balancing, and subsequent OWNER'S representatives' education and instruction.
  2. The OWNER education shall be administered by the CONTRACTOR, with special instructions from equipment technical representatives, CONTRACTOR qualified representatives, etc.
    - a. The instructions for the OWNER will include a complete walk-through of the facility, review of all mechanically related systems, and comprehensive education of the pertinent operating and maintenance requirements.
    - b. This shall include an overview of system components and descriptions, seasonal provisions/changes required, major valve location/function, safety provisions and concerns, normal operating and energy conservation techniques, actions to be taken with system failure or malfunction, start-up and shut-down instructions, reaction to fire and safety alarm annunciation, normal operating parameters, etc.
    - c. The education shall include all pertinent data from industry standards, minimal recommendations indicated herein and further as



- recommended by each manufacturer's O&M manuals.
- d. All equipment and material suppliers will also be expected to participate. The CONTRACTOR shall schedule with the A/E and designated OWNER'S Representative(s).
  - e. Additional instruction and education sessions shall be provided subsequent to the initial session to provide additional instruction as required to fully educate the OWNER'S operators.
3. The CONTRACTOR shall submit to the PROFESSIONAL in draft form, an outline of the contents of this education, with agenda and list of pertinent personnel, a minimum of thirty (30) days prior to project completion date and scheduling said instruction with the OWNER and PROFESSIONAL.
  4. When the seminar and subsequent instruction periods are completed, CONTRACTOR shall furnish ARCHITECT a letter signed by the OWNER certifying that his representative(s) has received adequate instruction in operation of installed equipment and systems. This letter shall be furnished prior to final acceptance of this project.
- B. Some suggestions for pertinent subject matter to include in the administration of the education of OWNER'S operation and maintenance personnel, is as follows:
1. Nominal Split and Packaged Direct Expansion Cooling and Heating Systems:
    - a. Air filter size, monitoring and changeout (note that CONTRACTOR is to provide a schedule to OWNER, indicating all systems, filter grilles, etc., and matched sizes) and number of air filters.
    - b. Periodic bearing lubrication
    - c. Periodic belt monitoring and adjustment
    - d. Periodic evaporator and condenser coil inspection and cleaning
    - e. Periodic monitoring of refrigerant charge by (1) visual observation of site glass, and (2) discharge air temperature monitoring
    - f. Normal temperature and fan controls setpoints for occupied and unoccupied periods.
    - g. Normal indoor humidity setpoints for all periods
    - h. Condensate drain periodic inspection and maintenance; including algaecide
    - i. Smoke detection and fire alarm interaction
  2. Potable Water Heaters and Accessories:
    - a. Normal setpoint and adjustment for water temperature from heater
    - b. Normal setpoint and seasonal adjustment for water temperature from mixing valve, along with safety/use instructions
    - c. Periodic maintenance for mixing valve
    - d. Periodic maintenance for recirculating pumps
    - e. Routine inspection of flue piping and discharge cap for soot build-up

on gas fired hoods.

- f. Function and periodic maintenance of T&P relief valve.
- g. Function and periodic maintenance of anode rods.

3. Exhaust Fans:

- a. Periodic bearing lubrication
- b. Periodic belt monitoring and adjustment
- c. Periodic fan blade & grille inspection for excessive dust build-up, etc.

4. Controls:

- a. Describe setup and operation (including override functions) of programmable thermostats.
- b. Calibration of sensors (temperature, humidity, etc.)
- c. Describe purpose of duct smoke detection, HVAC unit shut-down, and remote smoke detector alarm panels and reset procedures.

5. General:

- a. Warranties: Explain the various warranties. Explain to OWNER his role during the warranty period(s), his limitations who he is to call when a problem tied to a warranty issue occurs, for both the one-year standard warranty and extended warranties, etc.
- b. Special tools and spare parts
- c. Air filter spares
- d. Purpose of O & M Manuals (spare parts, O & M manufacturer's recommendations, trouble-shooting, etc.)
- e. Purpose of roof mounted hydrant.

6. Grease Interceptor:

Instruct Owner of design concept for grease interceptor and periodic maintenance, cleanout, etc.

3.4 CLOSEOUT DOCUMENTATION

- A. Seven (7) days prior to requesting a final inspection, the CONTRACTOR shall submit all O&M and closeout documentation to the ARCHITECT, to be turned over to the OWNER at the end of the project.
- B. The following checklist shall be utilized for compiling documentation and shall be included behind front cover of O&M manuals.
- C. CONTRACTOR shall initial and date each line item once completed and shall fax or email copy of the completed checklist to the PROFESSIONAL prior to final inspection request.

<b>CLOSEOUT DOCUMENTATION CHECKLIST PLUMBING</b>		
<b>PROJECT NAME:</b>		
<b>INITIALS OF PERSON COMPLETING TASK</b>	<b>DATE TASK COMPLETED</b>	<b>DESCRIPTION OF CONTRACTOR'S SUBMITTAL</b>
		Final TAB Report (3 each required)
		Signed Letter Record of Owners Personnel O & M Education
		Plumbing Operation & Maintenance Manuals (3 each)
		As-Built Drawings with Contractor's Stamp (3 each)
		Potable Water Sanitation Report and Certification
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Valve tag and floor plan location charts. See Section <i>Mechanical Identification</i> .
		Keys to plumbing stops and hose bibb boxes per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Plumbing Fixtures, Trim and Accessories</i> (provide written receipts with Owner's acceptance).

<b>CLOSEOUT DOCUMENTATION CHECKLIST MECHANICAL</b>		
<b>PROJECT NAME:</b>		
<b>INITIALS OF PERSON COMPLETING TASK</b>	<b>DATE TASK COMPLETED</b>	<b>DESCRIPTION OF CONTRACTOR'S SUBMITTAL</b>
		Final TAB Report (3 each required)
		Signed Letter Record of Owners Personnel O & M Education
		Mechanical HVAC Operation & Maintenance Manuals (3 ea)
		As-Built Drawings with Contractor's Stamp (3 each)
		Completed HVAC equipment factory start-up forms for each individual unit.
		Extended Warranties: (See Section <i>Mechanical Systems and Equipment Warranties</i> )
		Provide list of all spare air filter sets per Section <i>Air Cleaning/Treatment</i> . List number, size, type and location/equipment match-up.
		Pipe Test Log - Form in Section <i>Pipe and Pipe Fittings</i> to be comprehensively filled out.
		Duct Test Log - Form in Section <i>Ductwork</i> to be comprehensively filled out.
		Keys to control panels and sensor/controller covers per Section <i>Basic Mechanical Materials and Methods</i> and Section <i>Controls and Instrumentation</i> (provide written receipts with Owner's acceptance).

END OF SECTION

## SECTION 200050 - BASIC MECHANICAL MATERIALS AND METHODS

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. The requirements of this section apply to all sections of Division 20, 22 and 23.
- C. Definitions:
  - 1. Exposed: Piping, ductwork, and equipment exposed to view in finished rooms, including mechanical and/or equipment rooms.
  - 2. Option or Optional: CONTRACTOR'S choice of an alternate material or method.

## 1.2 PRODUCTS CRITERIA

- A. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.
- B. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
- C. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or otherwise permanently marked on each item of equipment.

## 1.3 FLAME SPREAD AND SMOKE DEVELOPED PROPERTIES OF MATERIALS

- A. Materials and adhesives used throughout the mechanical and electrical systems for insulation, and jackets or coverings of any kind, or for piping or conduit system components, shall have a flame spread rating not over 25 without evidence of continued combustion and with a smoke developed rating not higher than 50. If such materials are to be applied with adhesives, they shall be tested as applied with such adhesives, or the adhesives used shall have a flame spread rating not over 25 and a smoke developed rating not higher than 50. (Note: Materials need not meet these requirements where they are entirely located outside of a building and do not penetrate a wall or roof, and do not create an exposure hazard.)
- B. "Flame-Spread Rating" and "Smoke Developed Rating" shall be as determined by the "Method of Test of Surface Burning Characteristics of Building materials," NFPA No. 255, ASTM E84, Underwriter's Laboratories, Inc., Standard". Such materials are listed in the Underwriters' Laboratories, Inc., "Building Materials List" under the heading "Hazard Classification (Fire)".

## 1.4 HAZARDOUS MATERIALS

- A. No products shall be used that contain any known hazardous or carcinogenic materials. Products with asbestos or radioactive content shall not be used.
- B. Handling of any hazardous material is not covered in this specification Division.

## 1.5 EQUIPMENT FURNISHED BY OWNER

- A. The CONTRACTOR shall unload, uncrate, assemble, and connect any and all equipment shown on the Drawings or called out in the Specifications to be furnished by the OWNER for installation by the CONTRACTOR.

- B. The CONTRACTOR shall protect and take full charge of such equipment from the time the items are delivered to the job, set in place, connected, tested, adjusted, and placed into operation.

## PART 2 – PRODUCTS

### 2.1 EQUIPMENT ACCESSORIES

- A. Provide removable guards to enclose all rotating or moving elements. Construct of galvanized steel to withstand 250 lbs. static load.
- B. Wall/Ceiling Access Doors
  - 1. Panels in non-rated applications shall be galvanized steel, 18-gauge frame, 16-gauge door with mounting accessories, piano hinges, screwdriver operated lock, and prime coat paint.
    - a. Acudor Model UF-5000 for acoustic tile or exposed masonry
    - b. Acudor Model PS-5030 for plaster finishes
    - c. Acudor Model UF-5000 (stainless steel) for ceramic or glazed structural tile.
  - 2. Panels in fire rated applications shall be painted steel type, 1 hour rated, piano hinged, exterior key lock, nominal size 24" x 36" at equipment installations as approved, Air Balance, Inc. - Model "F".

### 2.2 ROOF CURBS

- A. Curbs shall be constructed as required to hold top level. See detail on Drawings for more information on curb construction requirements.
- B. Auxiliary supports under curbs shall be constructed as approved by ARCHITECT.

### 2.3 FIRE, SMOKE AND SOUND STOPPING

- A. UL listed penetration sleeve assembly and/or firestop that meets ASTM E-814 E119, and E84, as "3M" systems for the intended applications.
- B. All fire, smoke and sound stopping to be done by a separate licensed and certified Subcontractor as approved by Professional.

### 2.4 PIPE SLEEVES

- A. Galvanized sheet metal sleeves shall have lock seam joints and comply with the following minimum thickness:
  - 1. 24 Gauge for 3 inches and smaller.
  - 2. 22 Gauge for 4 inches to 6 inches inclusive.
  - 3. 20 Gauge for sizes over 6 inches.
- B. Galvanized steel sleeves shall be constructed from schedule 40 grade A53 pipe.
- C. PVC sleeves shall be constructed from solid core Schedule 40 PVC pipe.
- D. Water tight sleeves/seals shall be equal to "Link-Seal".

### 2.5 WALL, FLOOR, AND CEILING PLATES

- A. Chrome plated brass or chrome plated steel, one piece or split type with concealed hinge, with set screw for fastening to pipe, or sleeve.

- B. The thickness shall conform to the following requirements:
  - 1. Not less than 3/32 inch for floor plates.
  - 2. For wall and ceiling plates, not less than 0.025" for up to 3 inch pipe and 0.035" for larger pipe.
- C. All escutcheons shall be equal to Beacon, Caldwell or approved equal.

## 2.6 PROTECTIVE DRIP PANS

- A. Fabricate pans of 20-gauge galvanized sheet metal, stainless steel (if shown) or PVC, minimum two inches deep with rolled top edges.
- B. Solder all seams watertight, and cross brace pans to prevent sagging and warping.
- C. Provide dielectric union at copper pipe/galvanized pan connection point. Water heater drain pans shall have minimum one inch (1") drain outlet.

## 2.7 PAINTING OF MECHANICAL WORK

- A. See Division 09 for more information.
- B. See Section *Mechanical Identification* for color-coding of piping, etc. All other metal structure and hangers to be color of adjacent finish.

## PART 3 – EXECUTION

### 3.1 EQUIPMENT ACCESSORIES

- A. Provide access panels, or doors, at concealed dampers, valves, vents, equipment, inspection points, etc., and where noted. Where ceiling is "lift out" construction, ceiling access panels are not required. Panels shall be 15" square, or larger as approved for service intended.
- B. CONTRACTOR shall provide substantial metal angle frame and support at all ceiling access doors.

### 3.2 ROOF CURBS

- A. All roof mounted equipment shall be furnished with a roof curb compatible with both the equipment configuration and roofing system. Curbs shall be installed level by either shimming or sloped curb construction. See detail on Drawings for more information on curb construction requirements.
- B. Provide auxiliary support under all roof mounted equipment under curb base and at all penetrations as approved by ARCHITECT.

### 3.3 FIRE, SMOKE AND SOUND STOPPING

- A. Fire and smoke stopping shall be provided and installed at all locations where mechanical Work passes thru rated assemblies. This includes all ductwork, piping and controls related conduit.
- B. Penetrations in "sound" walls shall be similarly acoustically sealed, both sides of wall with caulk or other approved material. New and existing walls extending to the roof/floor structure above are considered sound walls.

### 3.4 PIPE SLEEVES

- A. Pipe sleeves shall be constructed of galvanized sheet steel except where noted below or in individual work sections.

- B. Pipe sleeves shall be constructed of galvanized steel or schedule 40 PVC pipe when pipes are located within or passing through the following:
    - 1. concrete beams
    - 2. outside walls
    - 3. foundations
    - 4. footings
    - 5. waterproofed floors
    - 6. In locations where sleeve is extended above finished floor
  - C. Where pipe motion due to expansion and contraction will occur, make sleeves of sufficient diameter to permit free movement of pipe.
  - D. Where pipes are insulated, make sleeves of sufficient diameter to pass pipe insulations.
  - E. Check floor and wall construction and finish to determine proper length of sleeves for various locations, make actual length to suit following:
    - 1. Terminate sleeve flush with walls, partitions, and ceilings.
    - 2. In areas where pipes are concealed as in chases, terminate sleeves flush with floor.
    - 3. In finished areas where pipes are exposed, extend sleeves 1/4" above finished floor except in kitchen, toilets, equipment rooms, and other areas where water may accumulate on floor, extend 1 1/2".
  - F. Interior openings shall be caulked tight with fire, smoke or sound stopping material and sealant to prevent the spread of fire, smoke, and sound. Contractor shall coordinate specific requirements to ensure fire, smoke or sound ratings are maintained.
  - G. For drilled penetrations in existing floors provide one-inch angle rings set in silicone sealant and bolted to the floor in lieu of pipe sleeves with one inch extension above floor.
  - H. Below grade exterior wall penetrations into habitable spaces, including crawlspaces shall include sleeves with water tight seals as "Link-Seal".
- 3.5 WALL, FLOOR, AND CEILING PLATES
- A. Exposed piping passing through walls, floors and ceilings, shall be fitted with escutcheons.
  - B. Inside diameter shall fit around insulation or around pipe when not insulated; outside diameter shall cover sleeve.
  - C. Use plates that fit tight around insulation or pipes when not insulated.
  - D. Plates shall cover openings around pipes/insulation and cover the entire pipe sleeve projection.
- 3.6 PROTECTIVE DRIP PANS
- A. Provide pitched drip pans where shown under all fluid conducting piping that is over electric switchgear, elevator controllers, busways or electric motor starters or as



indicated. Pans shall extend minimum two inches beyond each side of the mechanical equipment, pipe or group of pipes being contained. Pans shall extend six inches beyond electrical equipment below.

- B. Pitch pans shall be routed to a drain connection with discharge piped utilizing ¾" or larger of copper tube to the nearest available open drain or outside as directed by PROFESSIONAL. Open-end slices discharging to intercepting pans are not acceptable.
- C. Provide drip/overflow pans under water heaters, air conditioning equipment, pumps, etc., and where shown.

### 3.7 PAINTING OF MECHANICAL WORK

- A. All equipment shall present a clean painted appearance; touch up or repair as required.
- B. All surfaces shall be properly prepared prior to painting. CONTRACTOR must contact PROFESSIONAL, such that all tests, installations etc., are approved prior to painting.
- C. The CONTRACTOR shall prime (where applicable) and paint the following mechanical related Work:
  - 1. Piping of the following types which are outdoors and indoors when exposed to view, including mechanical rooms:
    - a. New Natural Gas Piping.
    - b. Existing Natural Gas Piping modified in this project. Existing piping shall be cleaned, primed and painted as specified herein.
    - c. Domestic Water Piping.
    - d. Sanitary Waste/Vent Piping.
  - 2. All exposed ferrous metal non-galvanized hangers, auxiliary supports, braces, etc., in all locations.
  - 3. All exposed and exterior galvanized ductwork, plenums, access doors, and control conduit, fitting, boxes, etc.
  - 4. All insulated refrigerant piping, pumps, valve bodies, etc., where exposed to view outdoors.
- D. Refer to Section *Mechanical Identification* for color-coding of piping, etc. All other metal structure and hangers to be color of adjacent finish.

### 3.8 WELDING

Before any welding is performed submit a copy of the Welding Procedure Specification (WPS) together with the Procedure Qualification Record as required by Section IX of the ASME Boiler and Pressure Vessel Code for each and every welder intended for use on this project and with qualifications and certifications suitable for work classification intended.

- A. Before any welder performs any welding, submit a copy of the Manufacturer's Record of Welder Operator Qualification Tests as required by Section IX of the ASME Boiler and Pressure Code. The letter or symbol (as shown on the qualification test form) shall be used to identify the work of that welder and shall be affixed, in accordance with appropriate construction code, to each completed weld.

Submit certification according to Section *Mechanical Submittals and Shop Drawings* for each and every welder and welding associated with the project.

- B. The types and extent of non-destructive examinations required for pipe welds are shown in Table 146.4 of the Code of Pressure Piping ANSI/ASME B31.1.

### 3.9 TOOLS AND KEYS

- A. Furnish, and turn over to the OWNER, special tools not readily available commercially, that are required for disassembly or adjustment of equipment and machinery furnished.
- B. Provide OWNER, at end of project with spare keys to stops, hose bibbs, control cabinets, tamper-proof controls covers, etc. Provide the following spares, and label with function/locations:
  - 1. Plumbing Stops – 8 keys
  - 2. Hose Bibbs – 8 keys
  - 3. Control Panels – 4 keys each panel
  - 4. Tamper-proof Controls Cover – 2 keys per cover
  - 5. Wall and Ceiling Access Doors – 2 keys per door

### 3.10 LUBRICATION

- A. During construction, all bearings and shafts shall be kept thoroughly greased and protected.
- B. After equipment has been operated seven days and before final acceptance, all bearings shall be inspected and filled to operating level with lubricant recommended by manufacturer. Tag each piece of equipment with cloth tag showing: proper type of lubricant, and period between lubrications, date of lubrication, and worker's initials. Have space for ten (10) lubrication notations.

### 3.11 WORK IN AND AT EXISTING BUILDING AND/OR BUILDING SITES

- A. Perform as described or shown on Contract Drawings, for relocation of existing equipment, alterations and restoration of existing building(s).
- B. As specified on Contract Drawings, make alterations to existing service piping at times that will least interfere with normal operation of the facility.
- C. It is important that CONTRACTOR thoroughly investigate existing conditions, utilities, services, finishes, sized, connections, etc., prior to bidding this project. The Designer's responsibility included only a cursory review of existing conditions and/or installations. It is the CONTRACTOR'S responsibility to coordinate a more thorough investigation and ascertain and confirm pertinent installation connections, etc., prior to his bid. This investigation shall be coordinated in a minimum seven (7) days advance of any published bid date such that the CONTRACTOR immediately thereafter can advise Designer in writing of any design discrepancies and/or changes required; otherwise, the CONTRACTOR shall be required to remedy any such peculiarities at his own expense and at no additional cost to the OWNER. It is the CONTRACTOR'S responsibility to verify existing size and/or location, etc., any time replacement and/or modifications to existing are included as a part of this project.
- D. Prior to excavation, investigation shall be made to the extent necessary to determine

the location of existing underground services, structures and conflicts. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures.

- E. The CONTRACTOR shall be responsible for obtaining the services of an "Independent Locator" whose function shall include location and identification of all underground service wiring, piping, coax, fiber optics, etc. The CONTRACTOR shall make every effort to protect and avoid conflicts with existing installations. Damage caused to existing installation by CONTRACTOR, or his Sub-contractor, etc., shall be promptly remedied and put back into service, per serving utility requirements.
- F. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the ENGINEER will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
- G. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the ENGINEER to prevent future damage or contamination of either structure.

### 3.12 PROTECTION AND CLEANING

- A. Equipment and materials shall be carefully handled, properly stored, and adequately protected to prevent damage before and during installation, in accordance with the manufacturer's recommendations and as approved by the PROFESSIONAL. Damaged or defective items, in the opinion of the PROFESSIONAL, shall be replaced.
- B. Protect all finished parts of equipment, such as shafts and bearings where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Tightly cover and protect fixtures and equipment against dirt, water chemical, or mechanical injury. At completion of all work thoroughly clean fixtures, exposed materials and equipment.
- C. Do not store insulation materials in building until it is enclosed and dry. Wet insulation shall not be installed.
- D. Fixtures, piping, ducts, equipment, etc., shall be cleaned per manufacturer's printed instructions and PROFESSIONAL'S instructions.
- E. Piping shall be: (1) flushed with clean water, (2) "blown out" with steam or compressed air, or (3) "swabbed out" as required, except where specified otherwise. All temporary connections required for flushing shall be provided and subsequently removed by the CONTRACTOR. See Section *Pipe and Pipe Fittings* for further instructions.
- F. Before final building interior finish is applied:
  - 1. Interior of air handling equipment shall be thoroughly cleaned.
  - 2. Drain pans shall be cleaned and then flushed with water after which all fans will run with air filters in place, etc., for 24 hours.

### 3.13 CUTTING AND PATCHING

- A. Do not cut into any major structural element without written approval of the

## ARCHITECT.

- B. Cut required openings through existing masonry or reinforced concrete with diamond core drills. Use of pneumatic hammer type drills, impact type electric drills, and hand or manual hammer type drills, will be permitted only with approval of the ARCHITECT. Locate openings that will least affect structural slabs, columns, ribs or beams. Refer to the ARCHITECT for determination of proper design for openings through structural sections and opening layouts for approval prior to cutting or drilling into structure. After ARCHITECT'S approval, carefully cut openings through construction no larger than absolutely necessary for the required installation.
- C. Patching shall be (1) of quality equal to, and of appearance matching existing construction, and (2) shall restore all services and construction that remains in use, to its condition prior to this contract, unless otherwise noted.

## 3.14 FLASHING

- A. Where pipes, ducts, etc., pass through roof or walls, flash and caulk.
- B. Provide flashing or caulking as required at each opening through outside walls or roof. Flashing through roof of same materials and methods as under Moisture Protection Division; through walls shall be aluminum unless noted otherwise.

END OF SECTION

## SECTION 200060 - PIPES AND PIPE FITTINGS

### PART 1 – GENERAL

#### 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified and/or shown or scheduled on Contract Drawings.
- B. Work included: Pipes, fittings, unions, couplings, flanges, gaskets, and other materials and instructions.

#### 1.2 PIPING SCHEDULE

Piping systems for this project shall include the following:

- A. Sanitary Waste and Vent Piping.
- B. Condensate Drain Piping.
- C. Domestic Water Piping.
- D. Natural Gas Piping.
- E. Refrigerant Piping.
- F. Equipment Utility and Relief Drain Piping.
- G. Grease Waste Piping

#### 1.3 MANUFACTURER'S ASSISTANCE

Manufacturer shall provide, if required, to the CONTRACTOR a factory trained service man to properly train CONTRACTOR'S personnel in all phases of installation.

### PART 2 – PRODUCTS

#### 2.1 PIPING MATERIALS

All piping installed on this project shall be new and of full weight and size indicated and of proper specification for service intended. Only domestic pipe may be used. Pipe and pipe fittings for the various systems shall be as follows:

- A. Sanitary Waste and Vent Piping.
  - 1. Piping above and below slab on grade extending to five (5) feet outside building perimeter, shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
  - 2. Sanitary waste piping below grade outside building shall be as specified in Paragraph 2.01.A.1 above.
- B. Condensate Drain Piping.
  - 1. Condensate drain piping routed indoors shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.
  - 2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings, or Schedule 40 PVC with solvent weld joints and fittings, paying close attention to spacing of piping supports in Section *Supports and Anchors*.
  - 3. Piping below grade shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.

- C. Domestic Water Piping.
1. Piping above slab on grade inside building shall be Type "L" copper with 95/5 soldered joints or specialty piping systems such as "ProPress" by Viega. "T-drill" or "pulled" taps/outlets shall NOT be utilized; only full body fittings will be allowed.
  2. Piping below slab on grade and to a point ten (10) feet from building perimeter shall be Type "K" copper pipe with brazed joints. Note: There shall be no joints below slab on grade except at building entrance service on piping 2" and larger.
- D. Natural Gas Piping
1. Piping above slab on grade and extending from meter or regulator shall be Schedule 40 black steel pipe complying with ANSI B36.10, ASTM A53 or ASTM A106 with class 150# Malleable iron or steel fittings. Joints in piping sizes 2" and smaller shall be screwed type. Joints in piping sizes 2 ½" and larger shall be welded with flanges at valves.
  2. Connections to gas-fired equipment, such as furnaces, shall include gas cock, drip leg and union and be rigid as detailed above.
  3. Flexible connections to equipment with input less than 75 MBH may be corrugates stainless steel tested, listed and installed in accordance with ANSI/AGA LL-1. Flexible connections shall not extend through unit cabinet. Flexible connectors in Kitchen and food prep/serving area applications shall be additionally PVC coated and NSF approved.
- E. Refrigerant Piping
1. Piping shall be Type "L" ACR copper with brazed joints. All joints, fittings and piping shall be brazed connection type. No flared or compression piping accessories allowed except at equipment connections.
- F. Equipment Utility and Relief Drain Piping
1. Indoor water heater T & P, backflow preventer and miscellaneous equipment relief and drain piping shall be full size connection Type 'L' copper with solder joints.
  2. Piping exposed outside of building shall be Schedule 40 galvanized steel with threaded joints and fittings.
- G. Grease Waste Piping
1. P-traps and tailpieces shall be Schedule 40 polypropylene with fused joints as Orion "blue-Line" or approved equal.
  2. Grease waste piping and fittings (except P-traps) below slab shall be service weight hub and spigot cast iron.
  3. Grease waste piping and fittings (except P-traps) above slab on grade shall be no hub cast iron.
  4. Vent piping and fittings from grease waste systems:
    - a. Above and below slab on grade piping shall be solid core Schedule 40 PVC with solvent weld joints and DWV fittings.

5. See detail on drawings for more information on P-trap/tailpiece/piping transitions required.

## 2.2 PIPE FITTINGS, UNIONS, FLANGES, AND GASKETS

- A. All fittings shall conform to pipe as to black steel, galvanized steel, copper, PVC or cast iron, etc. or as indicated. Fittings and accessories shall have equal or greater pressure rating than piping specified for particular application.
- B. Malleable steel fittings shall be minimum 150 psi class.
- C. Steel pipe unions shall be malleable iron having bronze to iron ground joints.
- D. Steel nipples shall be extra heavy type. All thread nipples prohibited. Provide a minimum of 1" of bare pipe between threaded ends of nipples.
- E. Flange bolts: Galvanized Alloy steel, ASTM #A 196, Galvanized GR. B 7; nuts' ASTM #S 194, GR. 2 H; both hex head style.
- F. Flange gaskets serving piping below 250 degrees F shall be synthetic composition type; serving above 250 degrees F gaskets shall be corrugated metallic type. Utilize gasket suitable for service intended.
- G. Couplings, steel pipe malleable iron, Grade II.
- H. Provide factory made reducers and increasers, and nipples of comparable materials as the piping. The use of bushings is not acceptable to obtain reduction or increase in sizes.
- I. Galvanized steel pipe shall be assembled with galvanized screw fittings unless specifically indicated otherwise.

## 2.3 DIELECTRIC FITTINGS

Provide where copper and ferrous metal are joined.

- A. 2-inch and less: Threaded dielectric union.
- B. 2 ½-inch and larger: Flange union with dielectric gasket and bolt sleeves.
- C. Temperature Rating, degree F: 210 for water systems.

## 2.4 BEDDING AND BACKFILL MATERIALS

- A. Type S1 – Select Fill
  1. Material shall consist of select, non-organic, debris-free silty clays or sandy clays with no more than 55 percent fines passing a No. 200 sieve.
  2. The plasticity index shall be within the range of 8 to 20.
  3. The liquid limit shall be less than 40.
- B. Type S2 – Course Aggregate
  1. Material shall consist of washed stone free of shale, clay, friable material, sand and debris.
  2. The aggregate shall be graded in accordance with ANSI/ASTM C33, size number 467.
- C. Type S3 – Pea Gravel
  1. Material shall consist of natural stone free of shale, clay, friable material,

sand and debris.

2. The material shall be graded to be between a minimum of 1/4" and a maximum of 5/8" in size.

D. Type S4 – Sand

1. Material shall consist of natural river or bank sand, washed free of silt, clay, or organic matter, loam friable or soluble materials.
2. The material shall be graded in accordance with ANSI/ASTM C33.

E. Type S5 – Crushed Stone

1. Crushed limestone, No. 610 gradation.

2.5 BEDDING AND BACKFILLING MATERIAL QUALITY CONTROL

- A. Tests and analysis of soil material shall be performed in accordance with ASTM D4318 or ASTM C136.
- B. Materials tested which do not meet the specified requirements shall be removed and replaced with acceptable material at no cost to Owner.
- C. Maximum dry density of the soil materials shall be determined by ASTM D698 and field density of in-place materials by ASTM D2922.

PART 3 – EXECUTION

3.1 PIPING INSTALLATION

A. General

1. Arrange and install piping approximately as indicated, straight, plumb and as direct as possible; form right angles or parallel lines with building walls. Keep pipes close to walls, partitions, ceilings, offset only where necessary to follow walls as directed. Locate groups of pipes parallel to each other; space them at distance to permit applying full insulation and to permit access for servicing valves. The PROFESSIONAL reserves the right to require this CONTRACTOR to make minor changes in pipe locations where conflicts occur with other trades or equipment. Such changes shall be made without extra cost to OWNER.
2. Install horizontal piping as high as possible without sags or humps. Grade drainage piping at uniform slope of 1/8" per foot minimum and maximum 1/4" per foot, or as noted. Where this is impossible, maintain slope as directed, but in no case less than 1/16" per foot. Pitch piping in direction of flow.
3. When piping is cut, it shall be reamed with pipe reamer and all burrs, scale, trash and foreign matter removed. If any piping is found installed without being reamed, cleaned, deburred, etc., or in any way contrary to above, it shall be sufficient reason for related erected piping to be removed, inspected by the PROFESSIONAL, corrected and reinstalled, all at CONTRACTOR'S expense.
4. Where size changes on horizontal lines, use reducing fittings; bushings are prohibited. On liquid lines have eccentricity down, hold the top level. On gas or vapor lines have eccentricity up, hold the bottom level.
5. Sufficient space shall be allowed in erecting piping for proper application of



thermal installations including fittings. In no case shall any insulation be cut or reduced thickness because of inadequate space.

6. Offset equipment connections to allow valving off for maintenance and repair with minimal removal of piping.
7. Locate valves for easy access and operation. Concealed valves shall be provided access doors. Do not locate any valves with stems below horizontal.
8. Install gauges, thermometers, valves and other devices with due regard for ease in reading or operating and maintaining said devices. Locate and position thermometers and gauges to be easily read by operator or staff standing on floor or walkway provided. Servicing shall not require dismantling adjacent equipment or pipe work.
9. Furnish and install unions or mating flanges at all connections to each piece of equipment conveniently located to facilitate quick and easy disconnecting of equipment. Flanges or union connections shall be used on both sides of traps, control valves, pressure reducing valves and meters and the like.

#### B. Steel Piping

1. Where piping is threaded, dies shall be clean and sharp. Threads shall conform to ANSUI B2.1; joint compound shall be applied to male threads only and joints made up so no more than three threads show. Coat exposed threads or steel pipe with joint compound and red lead paint for corrosion protection. The caulking of these joints will not be tolerated. Pipe joint compound must be approved by the PROFESSIONAL.
2. Where welding is specified or done, it shall be by electric arc by mechanics skilled in operation and holding a test certificate acceptable to the ENGINEER. All scale and flux shall be removed from piping after welding. Welding, beveling, spacing and other details shall conform to ANSI B31.1.

#### C. Plastic Piping

1. Install all fittings and joints as per manufacturer's recommendation.
2. Utilize purple pipe cleaning compound on all solvent weld joints.
3. Utilize manufacturer's recommended colored (non-purple) solvent glue on all solvent weld joints, unless manufacturer's installation instructions do not allow or if solvent glue is not rated for specific application.
4. Install all underground plastic and fiberglass glass piping outside building perimeter with tracer identification tape (per Section Mechanical Identification) and minimum 12-gauge bare copper wire for future location reference.
5. Install grease waste and vent piping per manufacturer's recommendation.

#### D. Copper Piping

1. Copper tubing shall be thoroughly reamed, cleaned with steel wool or emery cloth and a non-corrosive flux used before soldering or bracing.
2. Copper tubing shall be thoroughly reamed and de-burred before joining with specialty piping systems such as Viega "Pro-Press".

3. Where solder joints are specified, use solder having 95% tin and 5% antimony. Each roll of solder shall be clearly stamped as to grade and content.
4. Where brazing joints are specified, use a brazing filler metals having a melting point above 1100 degrees F and containing at least 5% silver.
5. Where copper tubing extends through concrete slab on grade, tubing shall have an "Armaflex" or "Rubatex" type.
6. Provide PVC isolation wrap where copper pipe extends through masonry walls to connect plumbing fixtures or valves, etc.

E. Refrigerant Piping

1. Braze joints in the presence of an inert gas.
2. Verify pipe size and configuration and provide same based on HVAC equipment manufacturer's recommendation to provide scheduled capacity, performance and maximize equipment life.
3. Refrigerant piping systems shall be installed in accordance with applicable chapters of the ASHRAE "Applications" handbook. Particular attention shall be given to suction gas, velocities and requirements for liquid sub cooling.

3.2 PIPE EXPANSION

- A. In the installation of all pipe runs where shown or where necessary, install swing joints, flexible couplings, turns, expansion loop or long offsets to allow for expansion. Broken pipe or fittings due to rigid connections must be removed and replaced at no additional cost to the OWNER.
- B. All lines shall be securely anchored where required. Where such anchors occur, they shall be securely fastened to the steel or concrete structure of the building in a manner approved by the PROFESSIONAL. Drawings shall be submitted before installation.

3.3 ANCHORS

Plastic pipe shall be jointed to steel systems with flanges. Steel system shall be anchored within five (5') feet of connection point to eliminate any thrust, stress, or torque from steel system to fiberglass and/or plastic system.

3.4 THRUST BLOCKS

All changes in direction of fiberglass or plastic pressure systems for 2" and larger systems shall be encased in concrete (3000 psi) thrust blocks to provide anchor points for direct expansion and contraction.

3.5 TESTS

- A. Cooperation/Scheduling:

The ARCHITECT shall be notified no less than ninety-six (96) hours prior to any pipe test. The ARCHITECT shall also be notified in adequate time for an inspection of the test before the test is completed. The PRIME CONTRACTOR'S Superintendent shall be responsible for administering and witnessing all tests, log it for permanent record and transmit to ARCHITECT at completion of project. CONTRACTOR shall refer to and make additional copies of the "Pipe Test Log Form" at the end of this section to use as standard test log forms. The PRIME

CONTRACTOR'S Superintendent shall keep this on-going log on jobsite and shall include the following:

1. Date of Test
  2. Duct/Piping Description (EX: "Sanitary Sewer")
  3. Location (EX: "Northwest Quadrant First Level")
  4. Results (EX: "Held 10 ft. of head for eight hours without leakage", etc.)
- B. Tests shall be as follows: (New and Existing Modified Piping shall be tested and all leaks repaired)
1. Gravity Flow Sanitary and Grease Waste and Vent piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
  2. Gravity Flow Condensate Drain piping above and below slab: Minimum 10 feet static head and as required by ASA A40.8 or local code, for a minimum period of four (4) hours, without discernable loss. All below grade piping and joints shall be clearly visible during test.
  3. Water Piping: (Domestic and circulating systems) 125 psi hydrostatic or 100 psi air, in conjunction with manufacturer's recommendations, with no discernable pressure loss for a period of eight (8) hours. Potable water piping shall be pressurized with water or air during all phases of construction such that leaks can be promptly identified and remedied.
  4. Natural Gas Piping: All gas piping shall be tested at twice the operating pressure, but not less than 30 psig, with compressed air or nitrogen, with no discernable pressure loss, for a period of not less than eight (8) hours. Oxygen shall not be used. All factory coated and wrapped piping below grade to be tested and proven tight with Holiday Leak Detector. All new and/or modified piping shall be tested to a minimum of 1.5 times the operating pressure or a minimum of 3 psig, whichever is greater.
  5. Refrigerant piping: 450 psig nitrogen for 8-hour period unless more stringent requirements are recommended by the equipment manufacturer. Test piping with all piping accessories such as charging valves and filter/driers in place, unless not recommended by equipment manufacturer's installation instructions. Refrigerant piping shall be left with minimum 60 psi pressure during all phases of construction such that leaks can be promptly identified and remedied.

### 3.6 SYSTEM CLEANING, TREATMENT AND PROTECTION

- A. Potable Water System: All new and modified existing potable water lines shall be thoroughly flushed and sterilized with a solution containing not less than 50 ppm available chlorine for eight (8) hours. During sterilization, operate all valves, faucets, etc., so that all portions of the system are reached. Flush system with clear water until concentration drops to 0.5 ppm. CONTRACTOR shall furnish sample to State Health Department attesting to satisfactory condition of water. Submit copy of test reports to ARCHITECT near end of project and prior to OWNER'S use of potable water distribution system.

### 3.7 BELOW GRADE PIPING INSTALLATION

#### A. Preparation

1. Prior to excavation, investigation shall be made to the extent necessary to determine the location of existing underground structures and conflicts. This CONTRACTOR shall coordinate and utilize the services of public and private "locators" to ascertain the whereabouts of all underground utilities in the area where work is to be performed.
2. When obstructions that are not shown on the Contract Drawings are encountered during the progress of work and interfere so that an alteration of the Drawings is required, the PROFESSIONAL will alter the Drawings or order a deviation in line and grade or arrange for removal, relocation, or reconstruction of the obstructions.
3. Appropriate traffic control devices shall be provided in accordance with federal, state, or local regulations to regulate, warn, and guide traffic at the work site.
4. Trees, shrubs, fences, and all other property and surface structures shall be protected during construction unless their removal is shown on the Contract Drawings and Specifications or approved by the OWNER.

#### B. Excavation

1. During excavation, material meeting the Type S1 requirements shall be stock piled in an orderly manner and at a sufficient distance from the banks of the trench to avoid over-loading and to prevent slides or cave-ins. Submit test reports to verify soil properties.
2. All excavated materials not required or suitable for backfill shall be removed and disposed of off-site at CONTRACTOR's expense.
3. Excavation and trenching shall be performed to allow utilities to be installed to lines and grades established by the Contract Drawings and Specifications with fittings and valves at the required locations unless otherwise approved by the PROFESSIONAL.
4. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated or as otherwise specified.
5. Excavated material shall be placed in a manner that will not obstruct sidewalks, driveways, or other structures.
6. Care should be exercised by the CONTRACTOR during excavation to avoid damage to existing structures and utilities.
7. When excavation of rock is encountered, all rock shall be removed to provide a clearance of at least 9 inches below and on each side of all pipe, valves, and fittings. The same shall also be performed when pieces of concrete or masonry and other debris or subterranean structures, such as masonry walls, piers, or foundations are encountered during excavation.
8. When crossing existing pipelines or other structures, alignment and grade shall be adjusted as necessary, with the approval of the PROFESSIONAL, to provide clearance as required by federal, state or local regulations or as deemed necessary by the PROFESSIONAL to prevent future damage or

contamination of either structure.

9. Removal of pavement and road surfaces shall be a part of the trench excavation and the amount removed shall depend upon the width of trench required for the installation of structures. The dimensions of pavement removed shall not exceed the dimensions of the opening required for installation of pipe and other structures by more than 6 inches in any direction unless required or approved by the OWNER.
10. Should the trench pass over a sewer or other excavation, the trench bottom shall be sufficiently compacted to provide support equal to that of the native soil or conform to other regulatory requirements in a manner that will prevent damage to the existing installation.
11. Temporary support, adequate protection, and maintenance of all underground and surface structures, drains, sewers, and other obstructions encountered in the progress of the work shall be furnished by the CONTRACTOR. All properties that have been disturbed shall be restored as nearly as practical to their original condition.
12. When the sub grade is found to be unstable or to include ashes, cinders, refuse, organic material, or other unsuitable material, such material shall be removed, to a minimum of at least 12 inches below the pipe level and backfilled up to original trench depth with Type S1 material.
13. Ditches shall be kept free of water during piping installation. Grading shall be done as necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or by other approved methods. Discharge from any trench dewatering pumps shall be conducted to natural drainage channels, storm sewers, or an approved reservoir.

C. Bedding and Backfilling

1. General Requirements:
  - a. The trenches shall not be backfilled until the installation conforms to the requirements specified.
  - b. Do not install backfill over porous, wet, frozen or spongy sub-grade surfaces.
  - c. In areas where less than 16" of ground cover exists, the piping shall be encased in concrete. Concrete shall be minimum 3000 PSI with reinforcing as indicated or required. Backfill shall be provided above concrete to original grade or sub-grade.
  - d. Pavement, base course, and compacted sub grade disturbed by trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent compacted sub grade, base course, and pavement for a minimum distance of 12 inches on each side of the trench.
  - e. If compaction tests indicate Work does not meet specified requirements, CONTRACTOR shall remove Work, replace and retest until specified requirements are met.

2. Bedding and Backfilling Requirements:
  - a. Bedding shall be provided for all piping, valves, etc.
  - b. Bedding material shall be either Type S3 or S4.
  - c. Bedding shall extend from 4" below bottom of pipe to 12" above top of pipe.
  - d. Backfill shall extend from 12" above top of pipe up to top of trench or original grade/sub-grade.
3. Placement and compaction of bedding and backfilling materials under roads, parking areas, etc. shall be performed as follows:
  - a. Place materials in continuous 6" thick horizontally placed loose layers and compact to 98% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
  - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
  - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.
4. Placement and compaction of bedding and backfilling materials under grassy areas, sidewalks, etc. shall be performed as follows:
  - a. Place materials in continuous 9" thick horizontally placed loose layers and compact to 95% ASTM D698 maximum density with stability (stability shall be the absence of significant pumping or yielding of the soils while compaction is being performed).
  - b. Adjust moisture content of materials utilized for bedding and backfilling with lime or other Professional approved method of restoring stability as required to obtain specified compaction requirements.
  - c. Compaction tests shall be performed for each lift of bedding and/or backfilling per 200 linear foot of piping length.

<b>PIPE TEST LOG</b>							
<b>DATE</b>	<b>SYSTEM</b>	<b>LOCATION OF TEST</b>	<b>TEST PRESSURE</b>	<b>LENGTH OF TEST</b>	<b>RESULTS</b>	<b>CONTRACTOR'S SUPERINTENDENT WITNESS INITIALS</b>	
						<b>PRIME</b>	<b>MECHANICAL</b>

Note: Turn in all forms filled out with project closeout documentation. Copy this form if more sheets are needed. These forms and/or log shall be kept at jobsite and upon request made available to ARCHITECT and/or PROFESSIONAL.

END OF SECTION





## SECTION 200100 - VALVES

## PART 1 – GENERAL

## 1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

## 1.2 APPLICABLE STANDARDS

Insofar as possible, all valves of the same type shall be of the same manufacturer.

## 1.3 VALVE DESCRIPTION AND IDENTIFICATION

- A. Valves shall have name or trademark of manufacturer and working pressure cast or stamped on valve body.
- B. Valve hand wheels shall be oriented when installed to provide maximum accessibility for operation.
- C. Valve discs shall be the manufacturer's standard material for the service in which the valve is used unless otherwise indicated under the individual type valve specification.

## PART 2 PRODUCTS (OTHER VALVES FROM THOSE LISTED MAY BE SUBMITTED FOR APPROVAL)

## 2.1 VALVES FOR DOMESTIC WATER APPLICATIONS

- A. All valves shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
- B. Ball Valves:
  - 1. Valves 2" and smaller shall be two-piece brass or stainless-steel construction, 1-1/4" extended neck, chrome plated ball with full port, P.T.F.E. seals and seats. Heavy duty steel handle with vinyl grip, quarter turn operation. Valves shall be suitable for working pressure of 200 psig and maximum 250deg F.
  - 2. Valves 2-1/2" and larger shall be same as above except that two or three-piece brass or stainless-steel construction may be utilized.
- C. Silent Check Valves:
  - 1. Silent check valves 2" and smaller shall be horizontal or vertical silent spring check type. Valves shall be rated for 200# WOG.
- D. Balancing Valves:
  - 1. Manual Type:
    - a. Combination balancing and positive shut-off valves shall incorporate a position indicator and memory stop or locking device so the valve can be closed without disturbing the setting, and be returned to the balanced position without further adjustment.
    - b. Balancing valves for sizes 3" and smaller shall be calibrated bronze balancing valves with provisions for connecting a portable differential pressure meter. Meter connections shall have built-in check valves and knurled caps. Valves shall have integral pointers to indicate the degree of valve opening.

## 2.2 VALVES FOR NATURAL GAS SYSTEM

- A. Plug Valves (for sizes 1¼" and larger, and at main service valves):
1. Valves shall be iron body (semi steel) lubricated, bolted glad type with Teflon coated plug. Flange unit for installation between 150# ASA steel flat-faced slip on weld flanges. All valves shall be wrench operated and wrench shall be furnished with each size valve. Each plug valve shall be serviced with the silicone sealant/lubricant recommended by the valve manufacturer. Valves 2" and smaller shall be short pattern type with threaded end connections. Valves shall be rated at 175# WOG.
  2. Valves shall be equal to:
    - a. Nordstrom Fig. 142
    - b. Walworth No. 655
    - c. Powell No. 2200
- B. Ball Valves (for sizes 1" and smaller)
- C. Valves shall be one quarter turn shut-off, listed for gas service, bronze construction, CSA B16.44 5 psig rated, UL 842 5 psig rated and ANSI Z21.15 ½ psig rated.
- D. Provide lever handle for equipment connections equal to McDonald Model 10710.

## 2.3 CHROME PLATED VALVES

Valves in exposed domestic plumbing connections to equipment shall have chrome plated finish.

## 2.4 KITCHEN COOKING BATTERY GAS SERVICE PIPING VALVE

A single mechanical or electric solenoid valve for each kitchen cooking hood shall be installed concealed above ceiling or as directed by local governing authority to isolate all gas-fired equipment under kitchen hood should fire alarm in same zone annunciate or by hood fire protection system manual pull station. Coordinate type and location of valve with hood fire suppression system and fire alarm Sub-contractors.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Installation shall be such that the valve can be fully opened and have at least 6" clearance beyond valve stem handle and sufficient clearance to remove stem for repair.
- B. Locate and orient valves to permit proper operation and access for maintenance of packing, seat and disc. Generally, locate valve stems in overhead piping in horizontal position. Provide a union adjacent to one end of all threaded end valves. Control valves usually require reducers to connect to pipe sizes shown on the drawings. Install butterfly valves with the valve open as recommended by the manufacturer to prevent binding of the disc in the seat.

### 3.2 DISCHARGE FROM SAFETY AND/OR RELIEF VALVES

Relief valves relieving steam, gas of any type, including compressed air, or liquid above 120 degrees F., shall be piped full size to outside building or as indicated so that discharge cannot hit any person or structure.

3.3 RELIEF VALVE CAPACITY

Valve relieving capacity shall meet all code requirements and also be equal to at least 1.25 of possible heat input to be relieved.

END OF SECTION



## SECTION 200120 - PIPING SPECIALTIES

### PART 1 – GENERAL

#### 1.1 SCOPE

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Piping specialties to connect fire protection and plumbing equipment.

### PART 2 – PRODUCTS

#### 2.1 BACKFLOW PREVENTERS

- A. Install a backflow prevention device at any point in the domestic water system where the potable water supply comes in contact with a potential source of contamination. Devices shall be certified by a recognized testing laboratory and be AWWA C-511-89 FCCCHR of USC, UPC, and IPC compliant. Listed below is a partial list of connections to the water system which shall be protected against backflow or back siphonage.
  - 1. Atmospheric Vacuum Breaker:
    - a. Hose bibbs and sink faucets w/threaded outlets.

#### 2.2 HEAT TAPE

- A. Provide tracing for piping for freeze protection and as indicated on the Drawings. Systems shall meet requirements of the National Electrical Code (NEC), Section 427. Provide tracing where any water piping is installed in unconditioned interior space where freeze conditions may exist.
- B. Heating Cable: Flexible, parallel circuit construction consisting of a continuous self-limiting resistance, conductive inner core material between two parallel copper bus wires, designed for cutto-length at the job site and for wrapping around valves and complex fittings. Self-regulation shall prevent overheating and burnouts even where the cable overlaps itself.
  - 1. Provide end seals for ends of circuits. Wires at the ends of circuits are not to be tied together.
  - 2. Provide sufficient cable, as recommended by the manufacturer, to keep the pipe surface at 36 degrees F. minimum during winter outdoor design temperature, but not less than the following:
    - a. 3-inch pipe and smaller (with 1-inch insulation): 4 watts per foot of pipe.
    - b. 4-inch pipe and larger (1 ½-inch thick insulation): 8 watts per foot of pipe.
- C. Electrical Heating Tracing Accessories:
  - 1. Power supply connection fittings and stainless-steel mounting brackets. Provide stainless steel worm gear clamp to fasten bracket to pipe.
  - 2. 1/2-inch wide fiberglass reinforced pressure sensitive cloth tape to fasten cable to pipe at 12-inch intervals.

- 3. Pipe surface temperature control thermostat: Cast aluminum, NEMA 4 (watertight) enclosure, 1/2-inch NPT conduit hub, SPST switch rated 20 amps at 480 volts AC, with capillary and copper bulb sensor. Set thermostat to maintain pipe surface temperature at not less than 34 degrees F.
- 4. Signs: Manufacturer's standard (NEC Code), stamped "ELECTRIC TRACED" located on the insulation jacket at 10-foot intervals along the pipe on alternating sides.

2.3 GAUGES, PRESSURE

- A. Type 1, (pressure for water), initial mid-scale accuracy one-percent of scale (Qualify grade), metal or phenolic case, 4-1/2 inches in diameter, 1/4-inch NPT bottom connection, white dial with black graduations and pointer, clear glass or acrylic plastic window, suitable for board mounting. Provide red "set hand" to indicate normal working pressure.
- B. Provide brass, lever handle union cock. Provide brass/bronze pressure snubber for gauges in water service. Gauge cocks shall be Weksler Type A, Trecise No. 880 or Weiss Type LC.
- C. Range of Gauges: For services not listed provide range equal to at least 130 percent of normal operating range:  
 Domestic Water.....0 to 100 psig

2.4 THERMOMETERS

- A. Light powered, liquid crystal display, °F or °C selector switch and 6" brass stem with adjustable angle as required to read display from eyelevel.
- B. Separable Socket (Well): Brass, extension neck type to clear pipe insulation.
- C. Scale range may be slightly greater than shown to meet manufacturers' standard. Required ranges in degrees F:  
 Domestic Water.....30 to 180
- D. Equal to Weiss Instruments, Inc "Digital Vari-angle" or Weksler "AAD" series.

PART 3 – EXECUTION

3.1 INSTALLATION

All equipment shall be installed as per manufacturer's recommendation and applicable codes and standards. Provide appurtenances as required for a complete system. Provide all appurtenances as indicated on Contract Drawings, where specified or not.

END OF SECTION

## SECTION 200140 - SUPPORTS AND ANCHORS

### PART 1 – GENERAL

#### 1.1 SCOPE

Provide all labor, equipment, material, etc., required to complete installation as specified herein and/or shown or scheduled on Contract Drawings.

#### 1.2 SUPPORT

Supports shall be installed in one of the following methods: (1) from wood using coach screw on open construction and hanger flanges on sheeting, (2) from concrete using inserts, (3) from steel using beam clamps, rivets or bolts, (4) from concrete blocks using toggle or through bolts. Fasten supports to building in following order of preference: (1) steel framing, (2) concrete, (3) wood framing, (4) masonry, (5) wood sheathing. Do not support from roof deck without approval. All hangers, rods, and inserts shall be Underwriters' Laboratories approved for the service intended and meet MSS #SP 58 and 69.

### PART 2 – PRODUCTS

#### 2.1 HANGERS, SUPPORTS, ANCHORS AND GUIDES

- A. All hangers, fasteners and accessories exposed to view indoors shall be galvanized or zinc plated. Similar installations outdoors shall be hot dipped galvanized materials and fasteners.
- B. Supports, hangers, anchors and guides shall be provided for all horizontal and vertical piping. Selection and application shall be in accordance with ANSI/MSS SP-69.
- C. All pipe supports shall be of type and arrangement hereinafter specified. They shall be so arranged as to prevent excessive bending stresses between supports. Specifically designed hangers shall be fabricated and installed in accordance with ANSI/MSS SP-69.
- D. All bracket clamp and rod sizes indicated in this specification are minimum size only. The CONTRACTOR under this section shall be responsible for structural integrity of all supports. All structural hanging materials except variable spring units shall have a safety factor of 5 built in.
- E. All piping routed on trapeze hangers shall be attached rigidly to same unistrut hanger bar with clamps designed by unistrut manufacturer as approved by PROFESSIONAL. Insulated piping clamps shall encapsulate piping, insulation and saddle.

#### 2.2 BASES AND PADS

- A. Concrete equipment pads shall be constructed of minimum 3000 psi reinforced concrete. Provide  $\frac{3}{4}$ " chamfer on all exposed top perimeter edges of pads.
- B. Top of equipment pads outdoors shall be minimum 3" above and below worst case finished grade and be reinforced and of a strength suitable for application.
- C. Pads shall be provided in the following applications:
  - 1. Air conditioning equipment outside building. Size pads to extend from building perimeter and extend minimum eighteen (18) inches around equipment on remaining three sides, or as indicated.

2. Backflow preventer enclosures outside building. Size pads to extend minimum twelve (12) inches around equipment on all sides, or as indicated.
3. Floor mounted water heaters, air handling units, boilers, pumps, and where shown or specified on Drawings.
4. Provide similar concrete surrounds at cleanouts, grease interceptors, wet wells, etc., and as indicated.

## PART 3 – EXECUTION

### 3.1 PIPING SUPPORT

- A. All hangers for insulated piping shall be sized to accommodate insulation and shield. No hangers for insulated piping may be installed directly below or onto pipe itself except domestic cold water, and condensate drain piping where insulation is for condensation and/or freeze protection only.
- B. Provide hanger spaced per International Plumbing Code, International Fuel Gas Code, and International Mechanical Code requirements for piping type and size.
- C. Support horizontal PVC pipe with hanger or pier, located close to hub; use one support for each pipe length, or every other joint, whichever is closer. Where maintenance requirements may impose torque, as at a cleanout, support on both sides of torque point.
- D. Provide hanger within 18" of each elbow, also provide hanger with 18" of connection to each piece of equipment.
- E. Support vertical pipe at base and at each floor. In addition, 1" or smaller copper pipe shall be supported at 5' intervals or midway between floors, whichever distance is shorter.
- F. Provide PVC or other approved coating for steel, cast iron or PVC pipe riser clamps. See applicable details.
- G. Pipes passing thru walls shall not bear on building construction. Provide sleeves and fire proofing sealant as per Section *Basic Mechanical Materials and Methods*.
- H. Maximum weights on hanger rods assuming a maximum operating temperature of 450 degrees F. shall be such that stress in tension shall not exceed 9000 psi, using root area of threaded portion.
- I. For copper pipe, supports shall follow schedule and specifications. Supports for uncovered lines shall be especially designed for copper tubing, and shall be of exact O.D. diameter of tubing and shall be copper plated.
- J. Shields at Hangers: Insulated pipe shall be protected at the point of support by a 180 degree insert of high density, 100 psi, waterproofed calcium silicate encased in a 180-degree galvanized sheet metal inverted saddle. Insert to be same thickness as gauges shown in chart below. Insulation insert to extend 1" beyond sheet metal on all insulated water lines. If pipe hanger spacing exceeds 12 feet, use double layer sheet metal shields. Check Section *Mechanical Insulation* for Alternatives.

PIPE SIZE	SHIELD LENGTH	MINIMUM GAUGE
1/2" - 2"	8"	24
2-1/2" - 4"	12"	20
6" - 8"	16"	16



- K. Provide all steel required for support of pipes and equipment other than steel shown on STRUCTURAL ENGINEER'S Drawings.
- L. All pipe supports shall be designed to avoid interferences with other piping, hangers, electrical conduits and supports, building structures and equipment.

### 3.2 OTHER MOUNTINGS

- A. Any piece of equipment installed in a finished ceiling or wall area shall be supported independently of the building finish. Ceiling mounted items shall be supported directly from the building structure.
- B. Support piping from structural steel members by malleable iron or formed steel beam clamps. Where suspended from concrete slabs, install inserts of malleable iron during building construction.
- C. Wire or perforated hangers will not be permitted. Provide adjustable split ring swivel malleable iron hangers for horizontal runs up to and including 3" pipe size. Provide adjustable steel clevis type hangers for pipes over 3".
- D. Provide malleable iron split ring hanger with copper finish and copper plated malleable iron adjuster for use with copper piping. For insulated piping, provide hangers sized to accommodate insulation.

END OF SECTION



## SECTION 200170 - ELECTRICAL REQUIREMENTS

## PART 1 – GENERAL

## 1.1 MECHANICAL WORK

All work performed under this Contract shall be in accordance with Division Electrical.

## PART 2 – PRODUCTS

## 2.1 STARTERS

- A. For each and every motor provided by CONTRACTOR, a new proper motor starter shall be furnished for installation, except that all starters for ½ horsepower single phase and smaller motors as specified and/or required shall be manual type.
- B. Heaters shall be of the melting alloy type, sized to the exact nameplate running current of the motor. Manually operated motors with magnetic controllers shall be provided with oil tight pushbutton stations and automatically controlled motors shall be provided with oil tight "hands off auto" automatic switches. All magnetic starters shall be provided with red bull's eye pilot light in cover. Energy for controlled circuits shall be taken from the load contacts from the starters. All power wiring and control wiring shall be run in rigid conduit in damp locations or electrical metallic tubing in dry locations, and shall conform to NEC Standards. Provide two sets each of normally open and normally closed auxiliary contacts for all magnetic starters.
- C. For all starters for three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- D. For manual and automatic controlled operation of 3/4 HP and larger motors, furnish magnetic motor starter with:
  - 1. Maintained contact starter with "hand off auto" switches.
  - 2. Trip free, thermal overload relays.
  - 3. Capable of accepting 3 external electric interlocks.
  - 4. "Red" run pilot bulb indicator.
- E. Where interlock or automatic operation is specified, regardless of HP, provide magnetic starter complete with "run off auto" switch so connected that in "run" or "auto" all safety controls shall stop the motor. Provide number and type of auxiliary normally open and/or closed contacts as required by specified control sequence.
- F. Size 2 and larger starters shall have control circuits individually fused from line side of starter, or lead side of breaker, on combination unit. Starters on service above 240 volts shall have 120 volts, built in control circuit transformer fused from line side.
- G. Each electrically operated item of equipment shall be suitable for proper operation on the electrical supply to which it is to be connected as directed on the Electrical Drawings. Prior to delivery on job site, it shall be the responsibility of the CONTRACTOR and any Sub-Contractors, equipment suppliers, etc. to determine from the Electrical Drawings the characteristics of the electrically operated item, and to furnish each item accordingly. CONTRACTOR shall pay the cost due to any modifications resulting from differences as compared to Basis of Design products.
- H. Provide soft start and soft stop magnetic motor starters for all motor three phase loads above 5 HP, as Magnetek Series RVS–DN with digital microprocessor

circuitry, and include the safeties as detailed above, with auto reset.

2.2 MOTORS

- A. All motors under this Contract shall be provided with thermal overload protection.
- B. Equipment shall operate properly under a 10% plus or minus voltage variation, and a 5% plus or minus frequency variation.
- C. Unless noted otherwise, motors shall be squirrel cage induction type with ball bearings. Motors ½ HP and smaller shall be 120 volts, single phase, with permanently lubricated bearings; ¾ HP and larger shall be 3-phase, Design "B" or "C", drip proof type, of minimum power factor and energy efficiency as listed herein.
- D. Motors shall be premium efficiency type as defined by energy policy act of 1992 (EPACT) and latest version of IEEE Standard 112, Test Method B.

HP	EFFICIENCY	POWER FACTOR
1	84	72
1.5	85.5	73..5
2	85.5	70.6
3	89.5	77.5
5	89.5	81
7.5	91.7	78.9
10	91.7	83
15	93	81
20	93.6	84
25	93.6	83.5
30	94	85.1
40	95.5	76
50	95.5	84.2
60	95.5	84.5
75	96	83.4
100	96	84.4

- E. Motors shall be rated for continuous, full load duty and capable of withstanding momentary overloads of 50%. Select motors so actual load does not exceed nameplate ratings, and does not use motor "service factor". All motor furnished for this project shall have minimum service rating factor of 1.15. All motors shall be highest energy efficient type for all mechanical applications.
- F. Except where interlock or automatic control is required, single speed single phase motors, ½ HP and smaller shall have manual motor switch with pilot light and thermal overload protection.
- G. Each motor to be installed outdoors shall be of the totally-enclosed fan-cooled type, or housed in a weatherproof housing. Motors for hazardous locations shall be properly furnished to suit application.
- H. Multi-speed motors shall, except as noted, be consequent pole, variable torque, single winding. When the speed ratios or the load characteristic dictates, the multispeed motors shall be separate winding types. Variable speed motors operating over an adjustable range of speeds shall be motors specifically designed

and rated for this duty.

### 2.3 ELECTRICAL FOR EQUIPMENT

- A. Motor controllers, protection devices, etc., for control and protection of equipment shall be furnished with the equipment, but installed and electrically connected to power source under Division Electrical.
- B. NEMA Standards shall be taken as minimum requirements for Electrical equipment.
- C. CONTRACTOR shall provide and install all disconnects for all MECHANICAL motors and loads unless equipment is provided with integral disconnect(s).
- D. All three phase motors in occupied areas shall be "quiet" rated and so marked.
- E. On all three phase motors, provide both overload and under voltage and over-voltage protection in all phases and protection from phase loss and phase reversal.
- F. Suitable enclosures for all electrical equipment shall be provided to suit environment as per NEMA and NFPA standards.
- G. Clearances of 36" shall be maintained around equipment less than 400V. Clearances of 48" shall be maintained around equipment greater than 400V.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Where electrical voltage and phase characteristics are specified hereinafter, verify them with the Electrical Drawings. In case of discrepancy between the Specifications and the Electrical Drawings, the Electrical Drawings shall govern.
- B. The CONTRACTOR shall provide power to all circuits, controls, and safety devices to every piece of mechanical equipment specified or shown on Drawings whether a power source is indicated or not on Electrical Drawings.
- C. The CONTRACTOR shall provide and extend fire alarm connections to all larger air handling equipment and provide code required smoke/heat detection sensors, etc., and automatic shutdown in the event of positive fire/smoke detection from any fire alarm sensor in same zone as served by same air system.
- D. Control wiring (120V. and less) shall be provided under *Division 20, 22 and 23* and extended from the 120V. power circuits indicated on the Electrical Drawings. All wiring for voltages higher than 30 volts shall be done by a licensed electrician.

END OF SECTION



SECTION 200190 - MECHANICAL IDENTIFICATION

PART 1 – GENERAL

1.1 SCOPE

- A. Piping System Identification
- B. Valve Identification System
- C. Equipment Identification
- D. Miscellaneous Identification

1.2 REFERENCES

ANSI A13.1 – Scheme for the Identification of Piping Systems

PART 2 – PRODUCTS – SPECIFIED AS PER INDIVIDUAL APPLICATION IN PART 3

PART 3 – EXECUTION

3.1 IDENTIFICATION OF PIPING SYSTEMS

- A. Identify all pipe after final painting and/or insulation with manufacturer’s preprinted labels at the following minimum locations:
  - 1. Straight runs of piping with a maximum spacing of twenty (20) feet.
  - 2. Adjacent to each valve.
  - 3. Adjacent to each branch takeoff point.
  - 4. On each side of where piping passes through walls/floors.

B. Letter shall be sized in accordance with the following:

<b>OUTSIDE DIAMETER OF PIPE COVERING</b>	<b>MINIMUM WEIGHT OF LEGEND LETTERS</b>
Up to 3/4"	1/2"
1" to 1-1/4"	3/4"
1-1/2" to 2"	1"
2-1/2" to 6"	1-1/2"

- C. At each legend, include a manufacturer’s label with an arrow to show normal flow.
- D. Identify location of outside underground piping by: (1) 4" x 18" concrete stakes, flush with finish grade, located above lines at end and/or corners or (2) by 2" x 2" brass plates embedded in building walls above pipes.
- E. Identify heat tape “traced” piping per Section Piping Specialties. This is in addition to piping identification as indicated below.
- F. Identify all non-metallic piping below grade with 2” wide metalized tracer continuous roll identification tape, with service, as Brimar Industries “Underground Tape 2” Detectable”. Install tape ± 12” below finished grade directly atop buried pipe, and 12-gauge bare copper tracer wire taped continuously to top of piping service. All tracer tape/wire shall be extended continuously between concrete stakes, and tied to stakes ± 6” below finished grade.

### 3.2 IDENTIFICATION OF PIPING ABOVE GRADE

- A. All piping exposed to view or concealed shall include manufactured labels on pipe in a visible location. Label shall be attached to pipe every twenty feet (20'). Labels shall be installed after piping has been painted and/or insulated.
- B. Labels to be utilized as follows.
1. In exposed applications, CONTRACTOR shall utilize pre-coiled, snap in place type markers as Seton "Setmark". On 6" and larger pipe, CONTRACTOR shall utilize nylon ties to secure marker to piping.
  2. In concealed applications, CONTRACTOR shall utilize a pressure-sensitive tape manufactured legend on all installations. Tape shall be tamper resistant vinyl tape for indoor as Seton "Opti-Code" and outdoor installations as Seton "Ultra-mark."
  3. Tape legend colors shall meet ANSI recommendations.
  4. On piping where markers do not include directional arrows, CONTRACTOR shall include similar manufactured stick-on flow arrows on all pumped circulating systems as Seton "Arrows On A Roll" with colors to match pipe legend tape identification.
- C. All insulated piping exposed to view everywhere and in mechanical rooms, shall include factory colored PVC jackets, non-insulated shall be similarly comprehensively painted in accordance with DIVISION 09 (colored coded as follows). (Verify colors with ARCHITECT prior to painting).

SERVICE	SYMBOL	COLOR
Sanitary Waste and Vent	San. W.	Dark Brown
Grease Waste and Vent	Grease	Light Green
Domestic Cold Water	DCW	Dark Green
Domestic Hot Water (115°)	DHW (115)	Light Blue
Domestic Hot Water Recirc. (115°)	DHWR (115)	Light Blue
Domestic Hot Water (140°)	DHW (140)	Maroon
Natural Gas	N. Gas	Yellow

- D. See Section Basic Mechanical Materials and Methods for paint specification. NOTE: Factory colored PVC jacket, per Section Mechanical Insulation, required on all insulated water piping in all equipment rooms and where piping is exposed inside finished spaces. Outside insulated water piping and fittings shall include additional metal jacketing cover.

### 3.3 VALVE IDENTIFICATION

- A. All major and branch valves in the HVAC, plumbing or fire protection system (except check valves) shall be tagged and numbered. A complete system schematic and floor plan location drawing with all such valves referenced to the tag assigned to that valve shall be framed and mounted where directed by the Professional. A copy of this system schematic shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual. Valve tags shall be brass, minimum 1¼" in diameter, engraved with white lettering on a colored background.



- B. Lettering shall be minimum 1/2" high, with sequential lettering designations distinct for each separate functional service, i.e. CW-1 for 1st cold water valve, etc. Submit proposed floor plan layout with valves to be tagged, schematic of valve chart and system, etc., to PROFESSIONAL for approval. Tags shall be as Seton Series 31490.
- C. Building main supply/service entrance valves shall be tagged with 2-1/2" wide x 1" tall stainless steel plates with screw mounting holes at corner. Tags shall include engraved black filled letters. Standard lettering size can be obtained from the Owner to maintain district wide consistency. Lettering shall be as indicated below stacked on two lines.
  - 1. Gas Cut Off Per MDE Requirements
  - 2. Water Cut Off Per MDE Requirements
  - 3. Irrigation Cut Off Per MDE Requirements

### 3.4 CEILING MARKERS

- A. All domestic water and gas shut-off valves located above lay-in tile ceilings shall include ceiling markers located on ceiling tile directly beneath valve.
- B. Ceiling markers shall be color-coded respective to function and shall include removable retention disk (fastener) to secure marker to ceiling tile.
- C. Ceiling markers shall be equal to MSI (Marking Services Incorporated).
- D. Equipment located above ceiling shall include designation tags, self-adhesive vinyl with unit identification (i.e VAV-1-01, EF-01, etc.)

### 3.5 EQUIPMENT IDENTIFICATION

- A. All equipment, starters, controls panels, switches, thermostats, humidistats and other control devices shall be permanently labeled with equipment being served. Equipment labels shall correspond to those shown on the Contract Documents.
- B. Individual functions and equipment on indicators and controllers on control panels shall be clearly permanently identified. Color code of labels, marking and identification shall be approved by PROFESSIONAL. This applies to the HVAC system, override panel, microprocessor time clocks and specialty annunciation specified in Section Controls and Instrumentation.
  - 1. Labels for equipment, starters and control panels shall be phenolic type with minimum 3/4-inch tall engraved lettering.
  - 2. Identification for individual controls devices including thermostats, humidistats, relays, switches, etc. shall be labeled with either phenolic type with minimum 1/2-inch tall engraved lettering or stick-on type from lettering machine.
- C. A reduced scale floor plan drawing with all devices referenced to the equipment served shall be framed and mounted where directed. A copy of this reduced scale floor plan drawing shall also be included in each of the Operations and Maintenance Manuals. Submit same to PROFESSIONAL for approval, prior to final mounting and inclusion in O & M Manual.

### 3.6 SAFETY/CONCERN NOTIFICATION

- A. Laundry, kitchen and other similar equipment and fixture installations utilizing water

with temperatures in excess of 125 degrees F., shall have neat phenolic permanent signage, mounted adjacent to and easily visible to users, indicating "**CAUTION: EXTREMELY HOT TEMPERATURES UTILIZED**". CONTRACTOR may substitute custom labeling as Seton "Custom on the Spot Labels," Style No. 11708.

- B. Provide OSHA and ANSI required safety signage at all emergency eye/shower stations, kitchen hood fire protection pull stations, safety and critical operating controls, etc. Signage shall be phenolic engraved type; submit to PROFESSIONAL for approval.

END OF SECTION

## SECTION 200240 - MECHANICAL SOUND AND VIBRATION CONTROL

### PART 1 – GENERAL

#### 1.1 SCOPE

Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.

#### 1.2 APPLICABLE STANDARDS

- A. ASHRAE, 2019 HVAC Applications Handbook, Chapter 49, "Noise and Vibration Control".
- B. The CONTRACTOR shall be responsible for providing and installing vibration isolation of the appropriate type and size for proper weight loading to meet the requirements of the specifications, and in accordance with instructions of the equipment manufacturer or vibration isolator manufacturer or its vendor.
- C. On completion of the work, the ENGINEER shall carry out an inspection and shall inform the installing CONTRACTOR of any further work that must be completed before final approval is obtained.

#### 1.3 MANUFACTURER

- A. All vibration isolators shall be supplied by a single approved manufacturer.
- B. The manufacturer's standard vibration isolation will be acceptable only if it meets this specification.

#### 1.4 VIBRATION AND SOUND CONTROL

- A. All rotating equipment shall be isolated from correcting piping, ductwork, structure or other rigid utilities, etc., by means of the appropriate vibration isolation. The CONTRACTOR shall provide and install the appropriate vibration isolation on any equipment, etc., with moving parts, whether indicated on Plans or not.
- B. The CONTRACTOR shall provide and install appropriate sound isolation as required to restrict sound production or transmission. CONTRACTOR shall install this insulation, baffle, etc., where indicated or as directed by ENGINEER.

### PART 2 – PRODUCTS

#### 2.1 VIBRATION ISOLATOR TYPES

- A. Unit FN (Floor Neoprene) - Smaller floor mounted equipment and for spacing between equipment and drain pans.
  - 1. These isolators shall be double deflection neoprene waffle pad. Pads shall be a minimum of 5/16" thick with size cut as required for particular equipment weight being supported.
  - 2. Isolators shall be Mason Type W – Neoprene Waffle Pads or approved equal.

#### 2.2 EXTERIOR METAL PARTS

- A. All metal parts of vibration isolation units installed out of doors shall be hot dip galvanized after fabrication.
- B. Galvanizing shall comply with ASTM A123, A153 and 386 as applicable.

- C. At the time of shipment to the job site, submit to the CONTRACTOR with copy to the ENGINEER, a certified statement by the galvanizer indicating conformity of galvanizing to ASTM Specification.

## PART 3 – EXECUTION

### 3.1 GENERAL

- A. Minimum static deflection of each vibration isolator unit shall be as shown in the equipment schedules and/or as described for each specific piece of equipment in these Specifications.
- B. Locations of all vibration isolation devices shall be selected for ease of inspection and adjustment.

### 3.2 EQUIPMENT MOUNTING

- A. No equipment unit shall bear directly on vibration isolators unless its own frame is suitably rigid to span between isolators and such direct support is approved by the equipment manufacturer. All support frames shall be sufficiently stiff and rigid so as to prevent distortion and misalignment of components installed thereon.
- B. Unless otherwise indicated, all equipment mounted on vibration-isolated bases shall have a minimum operating clearance of 2 inches between the equipment and the concrete housekeeping pad or floor beneath the equipment. The clearance space shall be checked by the CONTRACTOR to ensure that no construction debris has been left to short circuit or restrict the proper operation of the vibration isolation system.
- C. All wiring and other connections to vibration-isolated units shall be made flexible in order to avoid short-circuiting the isolators. A minimum 4-foot length of armored flexible conduit or cable installed in the shape of a U is acceptable for electrical connections. In the case of large diameter conduits, a sheet metal duct with flexible connection may be used for conduit connections to vibrating equipment. Flexible material shall be the same as that described for ducts connecting to fans.
- D. Under no conditions shall piping, ductwork or conduit be suspended from one another or physically contact one another. Vibrating systems shall be kept free from non-vibrating systems.
- E. Vibration isolation hangers shall be positioned so that hanger housings may rotate a full 360 degrees without contacting any object.

### 3.3 DUCTS

- A. The AHU returns, OSA, and discharge shall be connected to the ductwork with a flexible connector as described below, in order to prevent short-circuiting, and for sound and vibration isolation. Weatherproofing material shall be utilized when installed on exterior installations. Install connectors with slack, avoiding tight or misaligned connections.
- B. All other ducts connecting fans, etc., shall have a flexible connector as described above.

C. Flexible duct connectors shall be:

APPLICATION	METAL END CONNECTIONS	FABRIC
Split systems and fans less than 2200 CFM air delivery capacity.	Minimum 3" wide 28 gauge galvanized, as Duro Dyne "Econo Fab" Series with minimum 4" wide fabric.	Indoors: Minimum 15 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend.  Outdoors: Minimum 17 oz./sq. yd., as Duro-Dyne "Therma Fab" Series with Silicon Rubber coated woven fiberglass fabric.
Larger Commercial HVAC Systems with air delivery above 2200 CFM air delivery capacity.	Minimum 3" wide 24 gauge galvanized, as Duro Dyne "Super Metal Fab: Series, with minimum 6" wide fabric.	Indoors: Minimum 22 oz./sq. yd., as Duro-Dyne "Excelon" Series with vinyl coated woven nylon/polyester blend.  Outdoors: Minimum 24 oz./sq. yd. As DD "Durolon" Series with Hypalon coated woven fiberglass.

END OF SECTION



## SECTION 200250 - MECHANICAL INSULATION

## PART 1 – GENERAL

## 1.1 SCOPE

- A. It is intended that all heating and/or air conditioning ductwork, all storm drain piping above slab on grade and all domestic water piping above slab on grade throughout this project be insulated, except as specifically stated otherwise hereafter.
- B. Insulation shall include all insulating materials their applications, bands, tie wire, and weather protection for all pipe, fittings, valves, and equipment as indicated and as specified herein.
- C. Piping systems requiring insulation, types of insulation required, and insulation thickness shall be as listed herein. All fittings, flanges, and valves (except valve stems, hand wheels, and operators) in piping systems requiring insulation shall be insulated unless otherwise specified. Fitting, flange, and valve insulation shall be premolded, precut, or job fabricated insulation of the same thickness and conductivity as used on adjacent piping. Insulation exterior shall be cleanable, grease resistant, non-flaking and non-peeling.

## PART 2 – PRODUCTS

## 2.1 PIPING INSULATION

- A. Fiberglass pipe insulation (FG)
  - 1. Insulation shall have a thermal conductivity  $k=0.23$  at 75 degrees F.
  - 2. Insulation shall include a white ASJ with self-sealing overlap joints and seams.
  - 3. Insulation shall be equal to Johns Manville "Micro-Lok" or approved equal.
- B. Flexible elastomeric pipe insulation (FU)
  - 1. Insulation shall have a thermal conductivity  $k=0.25$  at 75 degrees F.
  - 2. Insulation shall be equal to Armacell "AP Armaflex".
- C. Phenolic (P)
  - 1. Insulation shall have a thermal conductivity  $k=0.15$  (density 10 pcf nominal)
  - 2. Insulation shall be equal to Insul-Phen.
- D. PVC pipe and fitting covers.
  - 1. Pipe and fitting covers shall be 20 mill thick flame retardant PVC. Fitting covers shall be neat, tight fitting radius type.
  - 2. Pipe and fitting covers shall be equal to Zeston type 300 or approved equal.
- E. Metal Protective Jacket
  - 1. Sheet Aluminum: ASTM B209, 3003 alloy, H 14 temper, 0.016 inch thick.
  - 2. Fitting Covers: Factory fabricated from not lighter than 0.020-inch thick type 3003 sheet aluminum.
  - 3. Bands: 3/4-inch wide .007 aluminum (or .005 stainless steel).

## 2.2 DUCTWORK INSULATION

- A. Rectangular Ductwork Interior Acoustical Liner
  - 1. See Section *Ductwork*.
- B. External Duct Wrap Insulation (Duct Wrap)
  - 1. Insulation shall be 2.2" thick and 3/4 pcf density fiberglass material with FSK facing. The "k" factor at 75° F., mean temperature shall not exceed 0.31 and shall meet NFPA 90A & 90B Standards.
- C. Rigid Board Insulation (Board)
  - 1. Insulation shall be one inch (1") thick with FSK outer skin and black matte durable finish meeting the requirements of ASTM G21 and G22.
  - 2. Insulation shall be equal to Knauf "Ductboard M" or CertainTeed "Ductboard with Enhanced Facing".
- D. Fire Wrap Insulation
  - 1. Insulation system shall be tested and classified to provide 2-hour clearance to combustible construction and a 1 hour fire rating per ASTM E 2336.
  - 2. Insulation shall be equal to "FireMaster FastWrap XL" by Thermal Ceramics.

## PART 3 – EXECUTION

### 3.1 GENERAL INSULATION INSTALLATION REQUIREMENTS

- A. The insulation shall be applied by licensed insulation applicators and all work shall be performed in a neat and workmanlike manner.
- B. No insulation shall be applied over pipes, fittings, or other surfaces, which are not clean.
- C. Insulation shall be applied after pipes have been thoroughly tested and proven tight by the CONTRACTOR.
- D. Piping insulation thru rated walls shall be coordinated with Section *Basic Mechanical Materials and Methods* and approved pipe sleeve and fire stop with UL Listing.
- E. Color coding of piping systems shall be in accordance with Sections *Basic Mechanical Materials and Methods* and *Mechanical Identification*. Piping identification after color coding shall be as specified in Section *Mechanical Identification*.
- F. Insulation shall be clean and dry when installed and during the application of any finish.
- G. Install materials neatly with smooth and even surfaces with jackets drawn tight and smoothly cemented down on longitudinal and end laps.
- H. Scrap pieces shall not be used where a full-length section will fit.
- I. Pipe insulation shall be continuous through sleeves, wall and ceiling openings.
- J. A PVC grommet shall be utilized at metal stud penetrations of piping, and insulation shall be installed snug to both sides of penetration with ends of piping insulation vapor sealed if specified.
- K. Piping and ductwork shall be individually insulated.



- L. Chrome plated pipes and pipes used solely for fire protection shall not be insulated.
- M. Equipment nameplates, access plates in fan housings and ductwork and the like for ventilating and air heating systems, shall not be insulated but insulation must be carefully beveled and sealed around it.
- N. Ductwork insulation shall be continuous through sleeves, wall and ceiling openings except at fire dampers in ductwork systems.
- O. Vapor Barrier Installation
  - 1. A complete moisture and vapor seal shall be provided wherever insulation terminates against metal hangers, anchors and other projections through insulation on cold surfaces for which a vapor seal is specified as identified in Part 3 paragraph 3.03 of this specification section.
  - 2. Seam and fitting covers shall be sealed with two (2) generous brush coat of fire resistant vapor barrier coating, applied at all longitudinal and circumferential laps.
  - 3. Ends of sections of insulation that butt against flanges, unions, valves, and fittings, and joints at intervals of not more than 12 feet on continuous runs of pipe shall be coated with a vapor barrier coating.
  - 4. Breaks and punctures in the jacket material shall be patched by wrapping a strip of jacket material around the pipe and cementing, coating as specified for butt strips. The patch shall extend not less than 1½" past the break in both directions.
  - 5. At penetrations such as thermometers, valve stems, etc., the voids in the insulation shall be filled with vapor barrier coating and the penetration sealed with a brush coat of the same coating.
  - 6. PVC fitting jackets in concealed applications shall be with a strip of insulation jacket and brush coat of vapor barrier sealant.
  - 7. PVC fitting jackets in exposed applications shall be neatly covered with a PVC/vinyl tape neatly smoothed.
- P. Installation at Hangers and Anchors
  - 1. Pipe insulation shall be continuous through pipe hangers.
  - 2. Where pipe is supported by the insulation, galvanized sheet metal shields or saddles 12 inches long shall be provided. Shields/saddles shall be 20-gauge galvanized sheet metal for pipes 6" and smaller and 18 gauge for pipes 8" and larger.
  - 3. Where shields are used on pipes 2 inches and larger, insulation inserts shall be provided at points of hangers and supports.
    - a. Insulation inserts shall be of calcium silicate, cellular glass (minimum 8 pcf), molded glass fiber (minimum 8 pcf), or other approved material of the same thickness as adjacent insulation.
    - b. Inserts shall have sufficient compressive strength to adequately support the pipe without compressing the inserts to a thickness less than the adjacent insulation.
    - c. Insulation inserts shall cover the bottom half of the pipe

- circumference 180 degrees and be not less in length than the protection shield.
- d. Vapor barrier facing of the insert shall be of the same material as the facing on the adjacent insulation.
- e. Seal inserts into the insulation with vapor barrier coating.
- 4. Where protection saddles are used, fill all voids with the same insulation material as used on the adjacent pipe.
- 5. Insulate and vapor seal insulation at anchors same as piping for a distance not less than four times insulation thickness to prevent condensation.

### 3.2 PIPING INSULATION INSTALLATION

#### A. Fiberglass pipe insulation (FG)

- 1. Install insulation with longitudinal laps and butt strips additionally smoothly secured with Benjamin-Foster 85-20 adhesive.
- 2. Fittings and valves on pipe shall be similarly insulated with thickness equal to the adjacent pipe.

#### B. Flexible elastomeric pipe insulation (FU)

- 1. Miter 90 degree turns and elbows, tees, and valve insulation.
- 2. Secure longitudinal joints with vinyl tape on 9-inch centers.
- 3. Bond cuts, butt joints, ends, and longitudinal joints with adhesive. After adhesive cures, apply 2-inch wide pressure sensitive adhesive vinyl tape over bonded cuts, joints, and ends.

#### C. PVC pipe and fitting covers.

- 1. PVC pipe and fitting covers shall be installed with a smooth appearance and no visible wrinkles.
- 2. All longitudinal seams shall be installed such the joints facing up or to the back of the finished product.
- 3. All longitudinal and circumferential PVC jacket joints and connections shall be spot welded every 12" with Perma Weld Adhesive and subsequently neatly sealed with tight fitting pressure sensitive vinyl tape, installed without wrinkles.
- 4. See Section *Mechanical Identification* for color coding of factory PVC jackets in exposed applications.

#### D. Metal Jacket Installation

- 1. Metal jackets shall have side and end laps at least 2 inches wide with the cut edge of the side lap turned under one inch to provide a smooth edge.
- 2. Secure jackets in place with aluminum or stainless-steel bands on 9 inch centers.
- 3. Place laps to shed water.
- 4. Seal laps with weatherproof coating.
- 5. Where pipes penetrate exterior walls, continue the increased insulation

thickness required for piping exposed to weather and the metal jackets through the sleeve to a point 2 inches beyond the interior surface of the wall.

6. In outside locations protect fittings, flanges, and valves with a weatherproof coating prior to installation of metal covers. Secure metal covers for fittings, flanges, and valves in place with metal bands and seal with a weatherproof coating.

3.3 PIPING INSULATION APPLICATIONS

PIPING INSULATION MATERIAL TYPE, SERVICE JACKET, VAPOR BARRIER AND THICKNESS TABLE									
SERVICE	INSULATION MATERIAL (NOTE 'A')	TYPE OF SERVICE JACKET REQ' D (NOTE 'B')	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)					NOTES
				1/2" - 1 1/4"	1 1/2" - 3"	3 1/2" - 6"	8" - 10"	11" - 36"	

DOMESTIC HOT AND RECIRCULATING	FG	B	YES	1	1.5	1.5	1.5	1.5	1,2,3,4,8
	FU	C	NO	1	1.5	1.5	1.5	1.5	
	P	B	NO	0.5	1	1	1	1	
DOMESTIC COLD WATER	FG	B	NO	0.5	1	1	1	1	1,2,3,4,8
	FU	C	NO	0.5	0.75	0.75	0.75	0.75	
A/C CONDENSATE DRAIN LOCATED INSIDE BUILDING	FG	A OR B	YES	1	1	1	1	1	4,5
	FU	C	NO	0.75	1	1	1	1	
DRINKING FOUNTAIN DRAIN PIPING (ON SEWER TIE-ON)	FG	B	YES	1	1	1	1	1	5
	FU	C	NO	1	1	-	-	-	
REFRIGERANT PIPING	FU	C	NO	SEE NOTES	SEE NOTES	-	-	-	6,8

NOTE 'A' - INSULATION MATERIAL				
MATERIAL	SPEC	TYPE	CLASS / GRADE	
FU	FLEXIBLE UNICELLULAR	ASTM C 534	-	-
FG	FIBER GLASS	ASTM C 547	I	1
P	PHENOLIC	ASTM C 552	-	-
CG	CELLULAR GLASS	ASTM C 1126	III	1

NOTE 'B' - TYPE OF SERVICE JACKET REQUIRED	
A	FOIL BACKED ALL SERVICE JACKET (ASJ)
B	PAPER ASJ
C	NONE

TABLE NOTES:

1. Flexible unicellular insulation shall be utilized on domestic piping concealed within interior and exterior walls and plumbing chases. After the building is completely in the dry, the Contractor may utilize fiberglass insulation in these applications.
2. Note that higher density insulation inserts shall be utilized on all water piping larger than 1-1/2" size, at all hanger/saddle supports, etc.
3. Insulation located outside shall be one inch thicker than shown in table

above.

4. A full coverage color-coded PVC jacket shall be required on insulated piping and fittings exposed in mechanical rooms, in crawlspace, and in interior exposed applications everywhere. See Section *Mechanical Identification* for color requirements.
5. Drain piping in concealed applications may be insulated with flexible unicellular or fiberglass.
6. Refrigerant piping shall be insulated as follows. Conventional heat pump or 2-pipe variable refrigerant systems shall have the larger pipe (hot gas line during heating operation) based upon the thickness corresponding to hot gas lines below and NOT the suction line thickness.
  - a. Suction lines -  $\frac{3}{4}$ " thick for pipes less than 1" in size, 1" thick for pipes equal to or greater than 1" in size.
  - b. Liquid lines – 1" thick for pipes less than 1-1/2" in size, 1.5" thick for pipes equal to or greater than 1-1/2" in size.
  - c. Hot gas lines – 1.5" thick for pipes less than 1-1/2" in size, 2.0" thick for pipes equal to or greater than 1-1/2" in size.
7. Not used.
8. Provide metal jackets over insulation on all insulated piping exposed to outdoor weather (including refrigerant piping).

### 3.4 DUCTWORK INSULATION INSTALLATION

- A. Rectangular Ductwork Interior Acoustical Liner
  1. See Section *Ductwork*.
- B. External Duct Wrap Insulation
  1. Insulation shall be installed in a manner to prevent compression of the insulation.
  2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
  3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.
- C. Rigid Board Insulation
  1. Insulation shall be installed in a manner to prevent compression of the insulation.
  2. When ductwork (rectangular or flat oval) with any vertical or bottom side is greater than 18", install pins and clips in a 12" o.c. grid, with pins within 4" of any longitudinal edge. Excess length of pins shall be snipped and top of pin/washer covered with pressure UL 181 pressure sensitive tape.
  3. All longitudinal and circumferential insulation seams shall be sealed with 3" wide pressure sensitive tape bearing the UL 181 label.

D. Fire Wrap Insulation

1. Install per instructions specified in an ICC-ES building code report and manufacturer’s recommendations to provide specified fire rating.

3.5 DUCTWORK INSULATION APPLICATIONS

DUCTWORK INSULATION MATERIAL TYPE, VAPOR BARRIER AND THICKNESS TABLE				
DUCTWORK FUNCTION/TYPE	INSULATION MATERIAL	VAPOR BARRIER REQ' D	INSULATION THICKNESS (INCHES)	NOTES

Rectangular Low Pressure Supply Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Supply Air	DUCT WRAP	YES	2.2	2
Rectangular Low Pressure Return Air	DUCT WRAP	YES	2.2	1
Round/Oval Low Pressure Return Air	DUCT WRAP	YES	2.2	
Rectangular Low Pressure Exhaust Air	SEE NOTES	-	-	3
Round/Oval Low Pressure Exhaust Air	NONE	-	-	
Kitchen Hood Exhaust Air	FIRE WRAP	YES	SEE NOTES	6
Kitchen Hood Make-up Supply Air (indoors)	DUCT WRAP	YES	2.2	
Kitchen Hood Make-up Supply Air (outdoors)	SEE NOTES	-	-	1
Transfer and Return Air Grille Plenum Boxes	BOARD	YES	1.00	5
Miscellaneous Ductwork and Accessories	DUCT WRAP	YES	2.2	4

TABLE NOTES:

1. See Section *Ductwork* for:
  - a. Additional acoustical internal insulation required in addition to specified external insulation. Omit external duct wrap insulation on indoor exposed ductwork.
  - b. Interior liner required on ductwork located outdoors.
2. See Section *Ductwork* for additional double wall sandwich insulation required in addition to specified external insulation.
3. See Section *Ductwork* for acoustical internal insulation required.
4. Miscellaneous Insulation and Acoustical Treatment Requirements:
  - a. Air Distribution Devices (Grilles, Registers and Diffusers):
    - i. The concealed frame and housing of all such devices above ceilings, in attics, walls, crawlspaces, etc., shall be factory insulated.
    - ii. When factory insulation is not available, duct wrap insulation shall be installed on any concealed frame, housings, plenums, etc.

- b. Control and Manual dampers shall be insulated such that automatic or manual operator is not impeded.
5. See Details on Drawings for more information and construction requirements.
6. Kitchen hood exhaust ductwork insulation thickness varies by application and manufacturer. Provide thickness as required to meet specified fire resistance rating.

END OF SECTION

## SECTION 220430 - PLUMBING SPECIALTIES

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Domestic water, sewer, roof drainage and condensate drains, including piping, equipment and all necessary accessories as designated in this section.
- B. Furnish all cleanouts and/or test tees as shown on Contract Drawings and required by Code. Cleanouts shall be the same size as the pipe they serve, except that 4 inches shall be the largest size required. Cleanouts shall be provided at the foot of each soil stack and of each run, change in direction, and mains, not to exceed 50 feet apart inside of building and 80 feet apart outside of building. The smallest flush floor cleanout shall be 3" unless otherwise noted.

## PART 2 – PRODUCTS

## 2.1 FLOOR DRAINS

- A. Floor drains shall be in accordance with ANSI A112.21.1. Provide caulking flange for connection to cast iron pipe, screwed outlets for connection to steel pipe, and side outlet when shown. Provide suitable clamping device and extensions if required, where installed in connection with waterproofing membrane. (Submit detailed shop drawings of these drains). Double drainage pattern floor drains shall have integral seepage pan for embedding in floor construction, and weep holes to provide adequate drainage from pan to drain pipe.
- B. The following plumbing drains are Jay R. Smith Models, however equal Zurn, Wade, Jonespec, MIFAB, Watts or Josam models are acceptable. Note: Provide flashing clamp when required with waterproofing membrane.
  - 1. FD-1 – Floor Drain: (Toilet Areas) Zurn Model Z415-7B, duco coated cast iron body with polished bronze 7" round strainer, clamping collar. Drain shall have trap primer connections where indicated. Size as indicated.
  - 2. FD-2 – Floor Drain: (Area Mechanical Room Traffic Type) Zurn Model Z539, duco cast iron body (10" deep), flashing collar, 12" square cast iron traffic ½ grate and slotted sediment bucket.
  - 3. FD-3 – Floor Drain: (Recessed Grate) Zurn Model Z415-7I, duco coated cast iron body with polished bronze 7" diameter extended rim strainer, clamping collar. Drain shall have trap primer where indicated. Size as indicated. Top lip to be installed flush with finished floor.
  - 4. FD-4 – Floor Drain: (Can Wash) Zurn Model Z540-G, galvanized iron body, flashing collar, adjustable top and sediment bucket. Bar grate strainer shall be 12" diameter nickel bronze.
  - 5. FD-5 – Floor Sink: (Kitchen Receptor) Zurn Model Z1950-KC-4-23 cast iron flanged receptor with acid resistant coated interior and nickel bronze rim and grate. Grate shall be 8-1/2" diameter nickel bronze with 2 ½" center hole.
  - 6. FD-6 – Floor Drain: (Kitchen Area Drain) Zurn Model Z550-Y-G, galvanized cast iron body with polished bronze 8" diameter strainer, clamping collar. Size as indicated.

## 2.2 TRAPS

- A. Provide traps on all sanitary branch waste connections from fixtures or equipment not provided with traps. Exposed brass shall be polished brass chromium plated with nipple and setscrew escutcheons. Concealed traps may be wrought cast brass. Slip joints not permitted on sewer side of trap. Traps shall correspond to fittings on cast iron soil pipe or steel pipe respectively, and size shall be as required by connected service or fixture, or as scheduled.
- B. All drains, overflow, condensate and relief, to be routed to a trapped hub or floor drain. If plans are not specific, check with PROFESSIONAL over routing of such drains.

## 2.3 OTHER DRAINS

Other required drains, including condensate drain piping, relief and overflow drain piping shall be provided and installed by CONTRACTOR. See BASIC MECHANICAL MATERIALS AND METHODS for piping specifications. Drains with outlets outdoors shall include insect screen neatly attached over opening.

## 2.4 CLEANOUTS

- A. Cleanouts shall be as manufactured by Wade, Jay R. Smith, Zurn, Watts, or Josam, and shall be as follows:
  - 1. Inside building, exposed on walls Zurn Model Z1446.
  - 2. Inside building where tile floors occur Zurn Model Z1400.
  - 3. Inside building where ceramic or quarry tile occurs Zurn Model Z1400.
  - 4. Outside building where concrete occurs Zurn Model Z1406.
  - 5. Outside building, no paving Zurn Model Z1449 with 18" x 18" x 4" concrete pad poured around cleanout with sloped top to shed water.
- B. All interior cleanouts to have polished bronze finish and exterior cleanouts a brass finish unless otherwise noted. All flush grade cleanouts and cleanouts in walks, etc., shall have inset square key stainless-steel covers.

## PART 3 – EXECUTION

### 3.1 INSTALLATION: (DRAINS)

- A. Floor drains shall be installed according to manufacturer's recommendations. Provide and install all flashing and weatherproofing as required. Adjust extension sections on all drains as required for proper height adjustment.
- B. All floor drains connected to sanitary waste system to be trapped. Connect floor drains to sanitary waste piping as indicated on Contract Drawings.
- C. The CONTRACTOR shall connect to roof drains and exterior roof downspouts and route new piping to its conclusion outside of building as indicated on Contract Drawings.
- D. Each AC equipment drip and drain opening which normally or frequently discharges water (such as air conditioning unit drains, pump base and stuffing box drips, overflows, and similar drips and drains) shall be connected to the drain openings or piped down directly over the floor drains which are provided for the purpose, as applicable, whether indicated on the Drawings or not.



- E. Each water relief valve discharge shall be piped down to 6" above floor, but not necessarily over a floor drain or connected to a drain opening, unless otherwise indicated. No drain piping is required from the discharges of drain valves, unless otherwise indicated.
- F. The top of all floor and trench drain strainer covers shall be cleaned and polished prior to final inspection by the PROFESSIONAL.
- G. Drains shall be provided at all coils, receivers, pump suction lines, pump plates where facilities are provided and at all low points of the systems. Such drains shall consist of the necessary pipe, valves and fittings required in the opinion of the PROFESSIONAL to permit servicing of equipment, systems, etc.

### 3.2 INSTALLATION: (CLEANOUTS)

- A. Install cleanouts such that each type is flush with floor, walls, outside grade, etc. Except as explicitly noted, all inside floor cleanouts shall be flush with finished floor surface.
- B. Flush grade cleanouts shall include a concrete pad surrounding cleanout as indicated above concrete pad and cleanout top shall be flush with finished grade.
- C. All cleanout plug threaded sections to be installed with appropriate lubricant and sealant for future maintenance and access.
- D. The top and faceplate of all cleanouts indoors shall be cleaned and polished prior to final inspection by the PROFESSIONAL.

END OF SECTION



**SECTION 220440 - PLUMBING FIXTURES, TRIM & ACCESSORIES****PART 1 – GENERAL****1.1 SCOPE**

- A. Provide all labor, equipment, materials, etc., required to complete installation as specified herein and/or shown or scheduled on plans.
- B. Work Included: Plumbing fixtures, associated trim and fittings necessary to make a complete installation from wall or floor connections to rough piping, and certain accessories.

**PART 2 – PRODUCTS****2.1 FIXTURE TRIM**

- A. All exposed metal parts of all fixtures, including faucets, waste fittings, waste plugs, flush valves, traps, supplies, nipples, and escutcheons shall be chrome-plated brass unless other materials or finish is specified. Basket and similar strainer assemblies for sinks shall be stainless steel.
- B. Drain and waste assemblies below lavatories and sinks shall be minimum 17-gauge chrome plated brass and traps shall include cleanout plugs.
- C. Stops and supplies:
  - 1. All stops and supplies shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
  - 2. Chrome plated brass/copper supplies shall be provided on all water supplies to fixtures. All hot/cold faucet handles for lavatories, sinks and bath/shower supply fittings shall include red and blue color code indications.
  - 3. Stops shall be chrome-plated brass, angle all bronze compression quarter turn ball type as McQuire LFBV series. Locate stops centrally above or below fixture in accessible locations.

**2.2 ESCUTCHEONS**

- A. Provide chrome-plated escutcheons on all water and drain piping in wall, floor and ceiling penetrations.
- B. Heavy-duty type escutcheons, with setscrews shall be utilized in exposed applications under wall mounted lavatories and sinks and on exposed piping applications on tank type water closet stops and on exposed piping to flush valves, etc.
- C. Light duty slip-on type may be utilized in concealed installations within cabinets.

**2.3 CARRIERS**

- A. Provide appropriate carriers for all wall mounted water closets, urinals, lavatories, electric drinking fountains, and sinks, and as indicated elsewhere in these specifications or on the drawings, or as required. All carriers shall be concealed, floor mounted type unless otherwise approved by the PROFESSIONAL.
- B. Where wall hung water closets, urinals, lavatories, electric drinking fountains, or sinks are installed back to back and carriers are specified, provide one carrier to serve both fixtures in lieu of individual carriers.

## 2.4 HANDICAPPED SERVICES

- A. Provide where required and/or indicated plumbing fixtures and installations that comply with the latest version of "American with Disabilities Act" (ADA).
- B. Provide neat pre-packaged molded insulation protection on an exposed drain and water piping below sinks and lavatories equal to TRUEBO Models #102 and #105.

## 2.5 PLUMBING FIXTURES AND TRIM

Furnish and install all plumbing fixtures specified herein and shown on plans. Kohler fixtures are specified, however, Eljer, or American Standard may be used if they are equal in all respects to those specified. CONTRACTOR shall submit data on trim as well as fixtures. All water closets, urinals and other fixtures associated with flush valves shall be water conservation type unless specified otherwise. All lavatory and shower supply fittings shall be of the flow restrictor type, unless specified otherwise. Flush valves shall be Zurn type "AV" or Sloan Royal with clog resistant design.

- A. Water Closets: All water closet seats shall have stainless steel mounting post and fasteners with "Sta-Tite" technology as Bemis or Church.
  1. WC-1 – ADA Compliant floor mounted vitreous china siphon jet with elongated bowl and 1-1/2" top spud, 2" passage and 1.6-gallon flush. (Coordinate with grab bar and ARCHITECT's details per ADA requirements. Install with handle opposite nearest corner installation).
    - a. Fixture: Kohler Model K96057 (Highcliff Ultra).
    - b. Flush valve: Zurn Model ZER-6000AV-WS1-ADA-MOB battery powered sensor operated with mechanical manual override button.
    - c. Seat: Bemis Model 10SSCT.
- B. Lavatories:
  1. L-1 – ADA Compliant wall mounted vitreous china with with 4" faucet centers and 5" backsplash.
    - a. Fixture: Kohler Model K 2005 (Kingston).
    - b. Faucet: T&S Brass Model EC-3103, 5" high, 4" clearance, 4-7/8" reach, 0.5 gpm vandal resistant aerator.
    - c. Carrier: Wade adjustable floor mounted wall carrier(s) as required.
  2. L-2 – Wall mounted (size 17"x15") 20 ga., 304 stainless steel (NSF listed), 4" faucet centers with basket drain and wall mounting bracket
    - a. Fixture: Advance Tabco Model 7-PS-66 with splash mounted gooseneck faucet with wrist blade handles and side splashes.
- C. Service Sinks:
  1. SS-1 – Terrazzo, drop front, floor mounted, corner mop sink (size 24"x24"x12").
    - a. Fixture: Acorn Model TNC-24.
    - b. Faucet: T&S Brass Model B-0665-BSTR mop sink faucet with vacuum breaker, wall brace and pail hook.
    - c. Accessories and Trim:
      - i. 20 ga. stainless steel cap on drop front
      - ii. 12" high stainless-steel back panels on all walls.
      - iii. Acorn Model KMH mop hanger (mounted above sink).

D. Hose Bibbs:

1. HB-1 - Freezeless Box Wall Hydrant: Automatic draining, hot and cold mixer wall hydrant in flush mounted wall box with "T" loose key, Wade Model 8706, anti-siphon vacuum breaker, Hydrant shall be 3/4 inch..
2. HB-2 - Hose Bibb: Roof mounted post-type hydrant equal to Murdock Model 3907 with integral check valve for backflow prevention. See Detail on Drawings for clarity.

E. Trap Primers:

1. TP-1 Trap Primer: Trap primer shall be connected to water closet flush valve. Exposed piping shall be chrome plated, provide chrome-plated escutcheon at mount to wall. Zurn Model Z-6000 TPO.

F. Trap Guard

1. TG-1 - Trap Guard: Flexible elastomeric tube treated to roll up when water is not passing through to resist emission of sewer gases, as ProSet®, MiFab, Smith, or Green Drain. Trap guard to be designed to meet dimensional and installation requirements of specified floor drain.

G. Water Hammer Arrestors (WHA):

1. Water hammer arrestors shall be piston type.
2. Water hammer arrestors shall be type approved for installation with no access panel required.
3. All water hammer arrestors shall be NSF 61 compliant and contain less than 0.25% lead (Pb) by weight.
4. The following schedule for Sioux Chief Hyrda-Rester arrestors shall apply:

P.D.I SYMBOL	FIXTURE UNIT RATINGS
A	4-11
B	12-32
C	33-60
D	61-113
E	114-154
F	155-330

H. Grease Interceptor (GT-1):

1. Schier Model GB-250. Tank to be designed for maximum flow rate of 100 G.P.M. and grease carrying capacity of 1000 lbs.
2. Interceptor shall be lifetime guaranteed and made in USA of seamless, rotationally-molded high-density polyethylene with minimum 3/8" uniform wall thickness. Interceptor shall be furnished for below grade installation. Interceptor shall be built in accordance to ASME A112.14.3 (type C) and CSA B481.1, with field adjustable riser system, built-in flow control, built in test caps and three outlet options. Interceptor flow rate shall be 100 GPM. Interceptor grease capacity shall be 1000 lbs. Cover shall provide water/gas tight seal. Provide heavy duty H20 traffic rated type lid/cover for all grease interceptors installed in paved areas. Provide with riser sections as required

to install covers flush with finished paving.

- I. IMB – Ice Maker Box: White powder coated steel recessed metal box with quarter-turn ball valve and integral water hammer arrester. Box equal to Guy Gray Model MIB1HAAB where installed in non-fire rated construction or Guy Gray Model FRIB12ABSHA where installed in fire rated construction. Provide with NSF 61 compliant (lead free) 10-foot-long stainless-steel icemaker connector equal. Make final connection to equipment.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Fixture Setting: Opening between fixture and floor and wall finish shall be sealed with silicone based caulking. Grout other excessive gaps as required.
- B. Supports and Fastenings: Secure all fixtures, equipment and trimmings to partitions, walls, etc., with brass through bolts, toggle bolts, expansion bolts, or power set fasteners, as required. Exposed heads of bolts and nuts in finished rooms to be hexagonal, polished chromium plated brass with rounded tops.
- C. Support wall hung lavatories and urinals by appropriate carriers.
- D. Tightly cover and protect fixtures and equipment against dirt, water and chemical or mechanical injury.
- E. Where water closet waste pipe rough-in is misaligned with fixture location, modify piping to eliminate relocation of water closet. On floor mounted water closets, offset closet flanges shall not be more than 3/4" and shall be non-reducing.
- F. Attach floor mounted water closets to closet flange.
- G. Items supplied by others as denoted are to be furnished complete with stops, risers, faucets, strainers, tailpiece, and traps. The intent is that this CONTRACTOR shall provide all "rough in" through face of wall and shall connect equipment provided by others, except where otherwise noted.
- H. All exposed metal trim and piping shall be chrome plated brass and polished.
- I. Trim which can be removed or disassembled without tools is not permitted.
- J. Furnish and install plumbing fixtures and pertaining appurtenances of the manufacturer and model number as indicated in these specifications and/or noted on the plans.
- K. Replace any fixtures or equipment broken, cracked, discolored, pitted, or otherwise imperfect.
- L. Setting height or location of fixtures shall be as dimensioned or as directed by ARCHITECT.
- M. Provide plumbing fixtures with accessible stops in supplies or with integral stops in faucets. Provide lavatory faucets, sink faucets, and supply stops with renewable seats.
- N. Provide closets with white bolt caps with retainer clips. Use all mineral gasket with plastic discharge sleeve having ethane core reinforcement.
- O. Install all wall, roof and ground hydrants in strict accordance with manufacturer's recommendations and applicable details on Drawings. Hydrants shall be installed

such that box/hydrant is square and plumb with adjacent building construction. Where wall hydrants are specified to match standard brick dimensions, adjust location in field to avoid cutting bricks and install with long dimension horizontal and hinge on bottom of box.

P. Install all fixtures in strict accordance with manufacturer's recommendations.

Q. Water Hammer Arrestors:

1. All water supply piping fittings and fixtures shall be protected against water hammer, shock or surge pressure by installation water hammer arrestors.
2. Water hammer arresters shall be installed per the manufacturer's recommendations. This shall include spacing, sizing, etc.
3. Fixture piping shall be adequately anchored to prevent vibration.
4. CONTRACTOR must guarantee against water hammer at end of project.

### 3.2 CLEANING:

At completion of all work, fixtures, exposed materials and equipment shall be thoroughly cleaned.

### 3.3 OPERATIONAL TESTS

Pour at least five (5) gallons of water into every floor drain to test for pipe stoppage. Remedy all stoppage.

END OF SECTION





## SECTION 220450 - DOMESTIC WATER HEATERS AND ACCESSORIES

### PART 1 – GENERAL

#### 1.1 SCOPE

Provide all labor, equipment, material, etc., required to complete water heater installations specified herein and/or shown or scheduled on Contract Drawings.

#### 1.2 APPLICABLE STANDARDS

- A. A.S.M.E. Code Sections where referenced or applicable.
- B. The water heater shall include all standard equipment as shown on manufacturer's specification sheet, shall fit properly into the space provided for it and shall conform to the Drawing requirements. The complete installation shall be in accordance with all applicable state and local codes and installation drawings/details.

### PART 2 – PRODUCTS

#### 2.1 DOMESTIC HOT WATER EQUIPMENT

- A. Large Commercial Natural Gas Water Heaters:
  - 1. Heater shall be of ASME glass lined design, UL listed with a working pressure of 160 psi, and ASME rating at 125 psi with appropriate stamp. Minimum storage capacity shall be as scheduled on Drawings.
  - 2. Heater and insulation shall meet minimum requirements of ASHRAE 90A.
  - 3. Heater shall be equipped with stainless steel water connections, and boiler type hand hole cleanout.
  - 4. Heater shall be equipped with an integrated control system consisting of a 180° F., adjustable thermostat with upper and lower sensing bulbs.
  - 5. Heaters shall be equipped with a manual reset gas shut off device, a gas pressure regulator set for fuel provided, coated steel burners, draft diverter and anodes for cathodic protection.
  - 6. The outer jacket shall have a baked enamel finish.
  - 7. Required approvals A.G.A. certification and NSF certification for 180-degree F service.
  - 8. Units to be furnished with properly sized ASME temperature and pressure relief valve.
  - 9. Unit shall be of energy efficient design, with flue damper and minimum A.F.U.E. of 90%.
  - 10. Provide separated combustion and venting/intake ducting per manufacturer's recommendations.

#### 2.2 ACCESSORIES

- A. Water Tempering and/or Mixing Valves:

All valves shall be furnished with integral check stops and a dial thermometer with the temperature range, of indicated extents, on the outlet of the valve assembly.

  - 1. MV-1: Digital (Electronic) Mixing

Furnish and guarantee a single temperature mixing valve assembly with ASSE 1017 compliance and CSAB/25 certified, that is constructed of bronze and/or stainless steel, to accurately (within +/-2° F.) control potable hot water from 140° F. stored water heater to mixed 110° F., with varying flow rate from a minimum 1.0 to a maximum 50 gallons per minute usage flow rate at 10 psi water pressure drop at the specified high end flow rate, and an entering cold water part temperature between 45° F. and 75° F. As Powers IntelliStation Jr.

- B. Relief Valve for Gas and Electric Water Heaters: Brass or bronze, fully automatic, self-closing combination pressure and temperature ASME relief valve. Pressure relief valve shall be spring operated with testing lever, set for 100 pounds pressure. Temperature relief valves shall contain a non-corrosive metal thermostat with bulb. Pipe discharge to floor or as directed on Drawings or by PROFESSIONAL.
- C. Circulating Pump:  
In line pumps shall be circulators with all bronze or stainless-steel waterway design. Pumps shaft shall have mechanical seal and shall be connected to motor shaft. Pump motor shall be sized for continuous duty operation, with sleeve or ball bearings and lubrication fittings, or system lubricated type. Pump shall be B & G, Grundfos, Taco or equal.
- D. Potable Water Expansion Tank (EXPT)  
Provide potable water expansion tanks with factory finished metal outer jacket with FDA approved rubberized bladder with pre-charged tank and charging valve. Acceptance volume shall be within five percent (5%) of minimum specified (see detail(s) on schedule on Drawings). Support units as recommended by unit manufacturer and Industry Standards. Expansion tanks shall be rated for 125 psi. ASME construction shall be provided where water heater is ASME constructed. See Schedule/Drawings for more information.

### PART 3 – EXECUTION

#### 3.1 LEAKAGE TEST:

Before connections are made, test heaters and tanks with hydrostatic pressure of 150 psig and prove tight.

#### 3.2 PERFORMANCE TEST:

- A. Prove system is balanced and 105 degrees F. is available at farthest outlet from heaters.
- B. Install heater as per manufacturer's instructions. Refer to Section *Basic Mechanical Materials and Methods* for instruction of ferrous to non-ferrous piping connections. Refer to Drawings for detail of water heater installation, if applicable.
- C. Provide all pipe, fittings, and accessories as indicated or required for complete installation.
- D. See Section *Testing, Adjusting and Balancing* for balancing flow through mixing valves, setting water heaters, and testing/setting fixtures and valves, etc.

END OF SECTION

## SECTION 230670 - PACKAGED AIR CONDITIONERS

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work Included: Self-contained units, rooftop units, window units, through-wall units, computer room units, and split systems.
- C. Warm air furnace/evaporator coil and condensing units.
- D. Definitions:
  - 1. Energy Efficiency Ratio (EER): A ratio calculated by dividing the cooling capacity in Btuh by the power input in watts at any given set of rating conditions, expressed in Btuh per watt (Btuh/watt).
  - 2. Unitary (ARI): Consists of one or more factory-made assemblies, which normally include an evaporator or cooling coil, a compressor and condenser combination, and may include a heating function.

## 1.2 APPLICABLE STANDARDS

- A. Refer to Section *Basic Mechanical Materials and Methods*.
- B. Safety Standards:
  - 1. Design, manufacture and installation of mechanical refrigeration equipment: ANSI B9.1.
  - 2. Machinery Guards: Provide guards as shown in AMCA 410 for belts, chains, couplings, pulleys, sheaves, shafts, gears and other moving parts regardless of height above the floor. Drive guards may be excluded where motors and drives are inside factory fabricated unit casings.
- C. Corrosion Prevention: Unless specified otherwise, equipment fabricated from ferrous metals that do not have a zinc-coating conforming to ASTM A386 or a duplex coating of zinc and paint shall be treated for prevention of rust with a factory coating or paint system that will withstand 125 hours in a salt-spray fog test, except that equipment located outdoors shall be tested for 500 hours. The salt-spray fog test shall be in accordance with ASTM B117 using a 20 percent sodium chloride solution. Immediately after completion of the test, the coating shall show no signs of blistering, wrinkling or cracking, no loss of adhesion, and the specimen shall show no signs of rust creepage beyond 1/8 inch on either side of the scratch mark. The film thickness of the factory coating or paint system applied on the equipment, shall be not less than film thickness used on the test specimen.
- D. ARI Standards:
  - 1. Capacity 135,000 BTU/HR and Greater: ARI 360.
  - 2. Capacity Below 135,000 BTU/HR: ARI 210. Units shall be listed in the ARI Directory of Certified Unitary Air Conditioners.

## PART 2 – PRODUCTS

### 2.1 UNITARY AIR CONDITIONERS

Self-Contained Combination Packaged Unit (Up to 25 Tons): Air-conditioner shall be a factory packaged cooling combination heating and cooling single zone unit as indicated and shall be suitable for mounting on either the roof of building or a concrete pad on ground as indicated on Drawings. The package shall consist of one or more refrigerant compressors with electric motors, cooling coils, condensers, fans, air filters, heating section, control wiring and piping, all factory assembled in a weatherproof enclosure mounted on a structural steel base ready for field connection to utilities and ducts. The package unit shall be sufficiently rigid and arranged to permit handling by a crane boom or by helicopter.

- A. Unit Enclosure: Construct with removable insulated access panels completely weatherized for outside installation, and properly reinforced and braced. Provide panels and access door for inspection and access to all internal parts. Provide insulated enclosure with adequate reinforced points of supports for setting of the unit. Joints shall be air and watertight. Base shall consist of a one piece welded assembly with 14 gauge members.
- B. Access to compressors, evaporator fan, controls and air filter sections shall include hinged access doors with weatherproof gasketed seal and quarter turn latches.
- C. See Detail on Drawings for curb construction requirements.
- D. Provide manufacturer approved heavy duty louvered or expanded metal grille hail guard spaced minimum 2" from face of condensing coil. See detail on Contract Drawings.
- E. Cabinet Insulation: One inch (1") thick and 3/4 pound density to prevent condensate from forming on the unit casing from air entrance at coils to air outlet of unit. Insulation shall meet the requirements of NFPA Standard 90A and be protected against deterioration and delamination from air currents. Insulate condensate drain pan with water impervious insulation of sufficient thickness to prevent condensate formation on the exterior at ambient conditions encountered.
- F. Evaporator Fan: Forward curved type (or backward inclined) DWDI Class I centrifugal type specifically designed and suitable for the operating pressure conforming to AMCA 210. Provide adjustable pitch pulley. Units shall have greaseable lubricated ball bearings. Statically balance fan assemblies in the fan housing and final assembly. Fan motors to be isolated with spring isolators. Fan motors shall conform to NEMA MG-1. Motor starters shall conform to NEMA ICS. Motors shall have thermal overload protection. Three phase motors shall have protection from phase loss, reversal, and high/low voltage.
- G. Compressors: Provide scroll type conforming to ARI 520, provided with all minimum standard equipment and accessories listed therein.
  - 1. Compressor shall be of the scroll type and shall include high and low pressure cutouts, overloads, and inherent thermostat.
  - 2. Compressors shall be suction gas cooled and include integral centrifugal oil pump to provide positive lubrication of all moving parts.
  - 3. Compressors shall include anti-slugging device, timed automatic restart delay and crankcase heaters.
  - 4. Individual compressor isolation valves shall be provided where compressors

are installed in tandem arrangement on the same refrigerant circuit.

5. Three phase compressors shall have protection from phase loss, reversal, and high/low voltage.

H. Coils:

1. Condenser, and evaporator coils shall be copper type with aluminum fins and conform to ARI 410 or as approved.
2. Condensing Coils for Multi-Compressors: Provide a separate air cooled condenser circuit for each multi-compressor separate circuited installation(s). If compressors are paralleled, provide not less than two independent circuits, and no less separate circuits or distinct levels of control than scheduled. A common-housing may be used, but each coil must be provided with separate controls to operate individual condenser fans for each coil. All coils shall sub-cooler. The air-cooled condenser coil shall be extended-surface fin-and-tube with seamless copper tubes with aluminum fins. The coils shall be tested for 425 psi. In the event one compressor fails, the other compressor(s) shall continue to operate on the other independent circuit.
3. Evaporator coils for multi-circuited systems shall be split face design.
4. Condenser coils shall be coated with a cathodic epoxy type electrodisposition coating formulated to uniformly cover all condenser-coil surfaces, including the edges of the fins, coils, heads, and frame, with a .8 – 1.2 mil layer. The coating shall be selected to provide excellent resistance and durability to corrosive effects of alkalis, acids, alcohols, petroleum, seawater, salt air and corrosive environments. Coat shall be proven to withstand a 3,000-hour salt spray exposure test, with coil's heat transfer capacity reduced less than one percent.

- I. Filter Boxes: Provide filter boxes with insulated hinged access doors with snug fitting air filter frame allowing a maximum 1% of scheduled air flow bypass.

Filters shall be of the high velocity to serve the airflow capacity indicated on Contract Drawings. See Section *Air Cleaning/Treatment* for air filter specifications, including type, efficiency and number.

- J. Heating Section (All units shall have heat in reheat position):

1. Primary heating/reheat capability (dehumidification mode).

Hot refrigerant gas condenser coil (when refrigerant compressor(s) are running) with two-position hot gas reheat valve.

2. Secondary/Supplemental Heating (in Reheat Position)

Gas Fired Furnace: Heat exchanger tubes and cylindrical drum shall be constructed of aluminized steel with a stainless steel power burner section. Stainless steel power burner shall have prepurge, electric spark ignition, 100% safety shutoff controls, electronic flame sensing controls, series gas valves and limit controls. Staging control shall be with separate gas valves. All controls shall be listed for operation at low outdoor air temperatures. Burner shall be equipped with inspection window and air shutter for combustion air adjustment. Complete service access shall be provided for controls and wiring. Shall be A.G.A. design certified for outdoor installation.

Units with cooling capacity exceeding 5 tons shall have 2-stage heating capability heat in the re-heat position. Provide multistage controls of capacity and characteristics as scheduled on Drawings.

K. Power Safety and Auxiliary Electric Controls and Accessories:

1. Three-phase units shall be provided with phase loss/reversal and brownout protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage, or the voltage is more than 10% under or over design voltage. These electrical controls shall include automatic restart capability.
2. Unit shall be provided with a factory installed 115 volt, 15 amp ground fault service receptacle. Receptacle to be factory powered.
3. Rooftop mounted equipment shall be provided with thru-base condensate drain, electrical, and gas connections.

L. Controls:

1. Unit shall be factory provided with a BACNET MSTP interface "card" to allow Owner's building EMS to read, reset, and control unit operation from remote workstation, etc.
2. Combination automatic heating/cooling changeover and auto-on fan switch shall be remotely zone mounted where indicated. Mount all other controls including motor starters and safety controls inside the enclosure. All wiring inside enclosure shall be accomplished at the factory. Unit mounted control panel shall include magnetic contactors for compressor, evaporator and condenser fan motors, three leg compressor overloads high and low pressure cutouts, oil pressure cutouts, non-recycling pump down and reset relay.
3. Condenser Controls: Provide head pressure control with variable speed condenser fans to insure condensing temperature for proper system operation at all ambient temperatures down to 0°F. Condenser fans to be heavy duty permanently lubricated ball bearing type with built-in thermal overload protection. Provide units with low ambient controls where scheduled with multiple cooling circuits or required to provide stable operation to suit application.
4. Condenser Start Up Control: Provide condenser with a start-up control package which permits start-up of compressor at ambient temperature of 0°F. Package shall temporarily by-pass system low pressure-start to permit start-up whenever minimum ambient temperature is below design evaporator coil suction temperature. Provide low ambient start-up capability where required to suit application.
5. Economizer:
  - a. Systems scheduled on Drawings shall have an outdoor air option with moisture eliminators and full economizer cycle and shall include motorized automatic exhaust fan or fans, and motorized automatic modulating return and outside air dampers. Economizer cycle shall be controlled on a differential enthalpy basis.
6. Provide low limit temperature sensors on face of evaporator on systems with

multiple refrigeration circuits for each stage of refrigeration, with adjustable time delay and automatic restart controls.

- M. Warranty: See Section *Mechanical Systems and Equipment Warranties* for more information.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION

Handle and install units and accessories in accordance with ARI 260 and the manufacturer's printed instructions. Unit shall be started up and checked out by a factory service representative. CONTRACTOR shall furnish PROFESSIONAL completed start-up report covering unit operation and start-up. A copy of same shall be included in Close-out Documents. See Section MECHANICAL CLOSE-OUT REQUIREMENTS.

#### 3.2 TESTS

Perform tests and make reports in accordance with Sections *Basic Mechanical Materials and Methods* and *Testing, Adjusting, and Balancing*.

#### 3.3 UNIT CAPACITY

Characteristics and capacity of systems shall be as indicated on Contract Drawings.

#### 3.4 CONTROLS

All systems will be provided with automatic heating/cooling changeover controls; one or two stage heating and/or cooling as required. Provide auxiliary time clocks and thermostats and/or humidistats as indicated in Section *Controls and Instrumentation*.

#### 3.5 AIR FILTRATION

See Section *Air Cleaning/Treatment* for specific requirements.

### END OF SECTION





## SECTION 230830 - HEATING/COOLING TERMINAL UNITS

## PART 1 – GENERAL

## 1.1 SCOPE

Unit heaters, electric ceiling and duct heaters or Gas-fire radiant tube heaters

## PART 2 – PRODUCTS

## 2.1 ELECTRIC WALL CABINET HEATERS

- A. Heater shall be of the vertical, wall type. Heater shall be constructed of 16 gauge steel with baked on enamel finish. Heater shall have aluminum centrifugal fan and motor. Heater shall utilize fin-tube electric heating elements. Unit shall have built-in controls.
- B. Capacity and characteristics shall be as indicated on Contract Drawings.

## PART 3 – EXECUTION

## 3.1 INSTALLATION

- 3.2 Handle and install units in accordance with manufacturer's written instructions.
- 3.3 Support units rigidly so they remain stationary at all times. Cross-bracing or other means of stiffening shall be provided as necessary. Method of support shall be such that distortion and mal-operation of units cannot occur.
- 3.4 Provide adequate vibration isolation as indicated or necessary.
- 3.5 Provide complete and operational controls, including low voltage thermostats, relays, transformer, etc. with all wiring in approved conduit. See *Division 26* specifications.

END OF SECTION



## SECTION 230860 - FANS

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Work included: Fans for heating, ventilating and air conditioning.
- C. Product Definitions: AMCA Publication 99, Standard 1-66.

## 1.2 APPLICABLE STANDARDS

- A. Fans and power ventilators shall be listed in the current edition of AMCA 261, and shall bear the AMCA performance seal.
- B. Operating Limits for Centrifugal Fans: AMCA 99 (Class 1, 11, and 111).
- C. Fans and power ventilators shall comply with the following standards:
  - 1. Testing and Rating: AMCA 210.
  - 2. Sound Rating: AMCA 300.
- D. Performance Criteria:
  - 1. The fan schedule shows CFM and design static pressure. Scheduled fan motors, ½ horsepower and larger, are to be sized for design CFM at 110 percent design static pressure, but not to exceed ¾-inch additional pressure.
  - 2. Provide fans and motors capable of stable operation at design conditions and at 110 percent pressure as stated above.
  - 3. Lower than design pressure drop of approved individual components may allow use of a smaller fan motor and still provide the safety factor. When submitted as a deviation, a smaller motor may be approved in the interest of energy conservation.
  - 4. Select fan operating point as follows:
    - a. Forward curved and axial fans: Right hand side of peak pressure point.
    - b. Airfoil, backward inclined or tubular: Near the peak of static efficiency.
- E. Safety Criteria: Provide manufacturer's standard screen on fan inlet and discharge exposed to operating and maintenance personnel.

## PART 2 – PRODUCTS

## 2.1 CENTRIFUGAL FANS

- A. General:
  - 1. Standards and Performance Criteria: Refer to Paragraph, QUALITY ASSURANCE.
  - 2. Construction: Wheel diameters and outlet areas shall be in accordance with AMCA standards.
    - a. Housing: Low carbon steel, arc welded throughout, braced and

supported by structural channel or angle iron to prevent vibration or pulsation, flanged outlet, inlet fully streamlined. Provide lifting clips, and casing drain. Provide manufacturer's standard access door. Provide screens for fan inlets without duct connections.

- b. Wheel: Steel plate with die formed blades welded or riveted in place, factory balanced statically and dynamically.
  - c. Shaft: Designed to operate at no more than 70 percent of the first critical speed at the top of the speed range of the fans class.
  - d. Bearings: Heavy-duty ball or roller type sized to produce a B10 life of not less than 40,000 hours, and an average fatigue life of 200,000 hours. Extend lubrication tubes for interior bearings or ducted units to outside of housing.
  - e. Painting: AMCA Standard preparation for coating 2601-66-1E33, followed by manufacturer's standard rust resistant baked enamel colored coating inside and out.
3. See Section *Electrical Requirements* for motor and starter requirements.
  4. See Detail on Drawings for roof curb construction requirements.

#### B. Exhaust Air Fans

1. Direct Drive Above Ceiling Type:
  - a. Fan shall be mounted above ceiling and vent routed as indicated. Fan shall have forward curved wheel constructed of aluminum. Fan motor shall be of the shaded pole type. Housing shall be of the steel construction with baked enamel finish. Grille mounted in ceiling shall be of extruded aluminum.
  - b. Capacity and characteristics shall be as indicated on Contract Drawings.
2. Rooftop Up-Blast Kitchen Hood Exhaust Fan:
  - a. Vertical up blast arrangement centrifugal fan with mounting bracket and curb cap. Fan shall be constructed of aluminum with non-overloading backward inclined type blower, statically and dynamically balanced.
  - b. Blades, fins, inlet cones and back panels shall be securely fastened into a rigid assembly.
  - c. Motor end drive to be isolated from exhaust air stream. Motor shall be of heavy duty type with highest efficiency/power factor. The well shaft shall be mounted in heavy-duty ball bearing pillow blocks, equipped with grease fittings. Both pulleys shall be fully machined cast iron type, keyed to the wheel and motor shafts. Bearings shall be of life design of not less than 200,000 hours.
  - d. Air for cooling the motor shall be taken into the motor compartment by means of an air tube from a location free of discharge contaminants.
  - e. The entire motor and drive assembly shall be removable thru the

support structure without dismantling the fan housing.

- f. Fan drives shall be sized for a minimum of 150% of drive horsepower. Pulley shall be of the adjustable type.
- g. The entire drive assembly shall be mounted on vibration isolators.
- h. Provide grease capture system and manufacturer's roof curb and vented curb extension to provide required discharge height as per UL and code requirements on kitchen hood applications.
- i. See Detail on Drawings for roof curb construction requirements.
- j. Capacity and characteristics as indicated on Contract Drawings.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install fan, motor and drive in accordance with manufacturer's instructions.
- B. Align fan and motor sheaves to allow belts to run true and straight.
- C. Bolt equipment to curbs with galvanized lag bolts, number and location per manufacturer's instructions.

### 3.2 PRE OPERATION MAINTENANCE

- A. Grease bearings and install maintenance notation chart per Section *Basic Mechanical Materials and Methods*.
- B. Rotate impeller by hand and check for shifting during shipment and check all bolts, collars, and other parts for tightness.

### 3.3 START UP AND INSTRUCTIONS

Check vibration and correct as necessary for air balance work.

### 3.4 ACCESSORIES

Provide all accessories including roof curbs, solid state speed controllers, wall mounting collars, insect and/or bird screen, OSHA approved motor and inlet/outlet protecting guards, back draft damper (motorized or manual as indicated), thermostats, vibration isolators and starters with pilots, etc., as indicated or required.

END OF SECTION



## SECTION 230870 - KITCHEN SUPPLY AND EXHAUST HOOD SYSTEMS

### PART 1 – GENERAL

#### 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. System includes, but not limited to, curbs, controls, fire protection system, enclosures, preheater, ductwork, hood(s), etc.

#### 1.2 APPLICABLE STANDARDS

- A. Applicable U.L. Standards.
- B. Applicable NFPA Standards.
- C. Applicable A.G.A. Ratings.
- D. Local Governing Authority Requirements.

### PART 2 – PRODUCTS

#### 2.1 KITCHEN HOOD SYSTEM

- A. Kitchen Hood(s)
  - 1. Provide hood(s) of type and configuration as shown on plans and in accordance with the following specification:
    - a. Kitchen Ventilation hood(s) shall be of the Type I, exhaust only wall or island canopy suitable for all types of cooking applications. The hood(s) shall be U. L. 710 Listed without fire damper for 400°F, 600°F, or 700°F rated cooking appliances. Make-up air shall be independently provided.
    - b. The hood(s) exterior and exposed surfaces shall be constructed of a minimum of 18 gauge 304 series stainless steel with a #4 polished finish. The hood(s) shall be constructed using the standing seam method for optimum strength. Front panels shall be of single wall construction. An integral 3 inch air space shall be provided to meet NFPA 96 clearance requirements against limited combustible walls. Integral 3 inch air space may be omitted for non-combustible construction. All seams, joints and penetrations of the hood enclosure shall be welded and/or liquid tight. All unexposed interior surfaces shall be constructed of minimum 18 gauge corrosion resistant steel including, but not limited to ducts, plenum, and brackets.
    - c. The hood(s) shall include a filter housing constructed of the same material as the hood. The high efficiency stainless steel filters shall be U. L. 1046 Classified and NSF Certified as manufactured by Greenheck, in sufficient number and sizes to ensure optimum performance. The filter housing shall terminate in a pitched, full length grease trough which shall drain into a removable grease container.
    - d. The hood(s) shall include a Performance Enhancing Lip (PEL) to improve capture efficiency by turning air back into the hood.

- e. Vapor proof, LED light fixtures shall be pre-wired to a junction box situated at the top of the hood for field connection. Wiring shall conform to the requirements of the National Electrical Code (NFPA #70-Latest Edition).
- f. They shall be built in accordance with National Fire Protection Association (NFPA) Bulletin #96, International Mechanical Code (IMC), Uniform Mechanical Code (UMC), and bear the National Sanitation Foundation (NSF) Seal of Approval. The hood manufacturer shall provide, on request, the necessary data that confirms compliance with the code authorities listed above.
- g. Provide quantity and size automatic fire protection system as required to conform with all applicable codes. The system shall be factory installed U.L. listed wet chemical type, providing protection of ducts, plenums and cooking equipment that may be a source of ignition of grease. All make-up air systems and sources of fuel or gas equipment and electric fryers shall be automatically shut off upon active operation of the system. The system shall be prepped in hoods at factory with all branch piping concealed. Storage bottles and actuation devices shall be installed, recessed mounted, inside access doors at end of hood as a self-contained unit as indicated on Plans. Fire protection actuation shall be interlocked with fire alarm system to annunciate/alarm as required by Code.
- h. An emergency manual pull station for fire protection system shall be provided and installed per plans or PROFESSIONAL'S direction. All piping exposed to view shall have chrome finish. Identify manual pull station with permanent phenolic signage per Section *Mechanical Identification*.

**B. KITCHEN HOOD SUPPLY FAN PACKAGE:**

- 1. The supply fan unit shall be of the belt driven, double width, double inlet, forward curved centrifugal blower type. The blower assembly shall be mounted on vibration isolators. Drives shall be sized for a minimum of 165% of driven horsepower. All exterior housing components of the supply unit shall be constructed of minimum 18 gauge galvaneal steel, painted with a weatherproof finish that has been baked for durability. Heavy gauge adjustable angle iron support legs shall be furnished with a prewired control center which shall include, but not be limited to, a master fused disconnect for main power connection, magnetic motor starters with thermal overloads and manual reset, fused 24-volt control transformer and distribution terminal strip for control wiring connection. All electrical components shall be U.L. listed, approved or classified where applicable and wired in compliance with the National Electrical code. Wiring shall be complete, requiring only one-point field connection for power service and one point field connection for low-voltage control harness.
- 2. Furnish motorized back draft damper as integral part of supply unit. Damper unit shall open upon energization of supply fan and close upon shut-off of supply fan.
- 3. See Detail on Drawings for roof curb construction requirements.



4. Fan package preheater shall be direct-fired gas with A.G.A. rated and U.L. listed controls as manufactured by Greenheck Fan Corporation, Schofield, Wisconsin. Unit shall be sized for 50 degree temperature rise based on supply air quantity as indicated on the Plan. Preheat controls shall be minimum ten-step modulating type down to 10% of maximum total heating capacity.
  5. Unit shall include, but not be limited to, direct-fired cast iron and stainless steel burner, modulating gas valve with duct sensor, main and pilot electric gas valves and pressure regulators, main and pilot shut off valves, air flow switch, high limit switch, flame safeguard relay, flame rod and electronic ignition pilot. Piping and controls shall be housed in a galvanized steel cabinet painted and integral with the fan package. Controls shall be accessible through a lift-out service door with twist latches.
  6. Provide interlock with matching kitchen hood exhaust fan(s). Provide common roof curb for mounting both supply and exhaust fan package, where indicated.
- C. Controls:
1. Provide control panel and flush mount as directed on Contract Drawings. This control panel shall include toggle switch(s) for controlling hood lights, start/stop station for exhaust fan.
  2. Pre-heater shall be controlled by duct-mounted thermostat set at 60 degrees F., adjustable. Provide all controls, contactors, relays, thermostats, etc., for complete, neat installation.
  3. Fire suppression system to be controlled automatically by hood sensor and manually at various manual wall-mounted pull stations. Fire protection control will automatically shut supply make-up fan off, shut gas service off and other utilities as described above and dump fire suppressant material. Alarm/annunciation interlock with fire alarm system and fan operation as per Code.

## 2.2 MISCELLANEOUS

- A. All equipment herein shall be furnished by one manufacturer who is regularly engaged in the production of this type of equipment. Equipment shall be furnished in strict accordance with these specifications and conform to NFPA Standard 96, State and local codes. Hoods shall be UL Listed and bear the N.S.F. Seal of Approval. Capacity and characteristics shall be as indicated on Contract Drawings.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Support: Hang kitchen hood by rods as recommended by hood manufacturer. Provide brace support structures required for a rigid installation. Support of all hoods shall require auxiliary support steel and bracing as can be coordinated with and approved by Architect and STRUCTURAL ENGINEER.
- B. Isolation: Provide vibration isolation on all ductwork to hood isolating all fans, etc.
- C. Enclosure: Provide enclosure and filler panels as required to seal any gaps, seams, etc., between multiple hood(s) and/or ceiling/walls. Match panels to hood exterior construction.

- D. Seal and waterproof roof or wall opening to fans. Provide all roof curb or wall brackets as required.
- E. Route full connection size drain of type "L" hard drawn copper from dish washer hood neatly to nearby waste receptor as approved by PROFESSIONAL. Piping shall be neatly painted with a chrome finish and supported adequately.
- F. It is the responsibility of the supplier and CONTRACTOR to verify specific installation requirements with the local governing authority and State Department of Health. These requirements shall be verified in advance of ordering equipment such that these special design or installation provisions shall be included in this project.

END OF SECTION

## SECTION 230885 - AIR CLEANING/TREATMENT

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required to complete installation specified herein and/or shown or scheduled on Contract Drawings.
- B. Descriptions:
  - 1. Air filters for Heating, Ventilating and Air Conditioning.
  - 2. Definitions: Refer to newest edition of ASHRAE 52.2 for definitions of face velocity, net effective filtering area, media velocity, resistance (pressure drop), minimum efficiency reporting value (MERV), etc.

## 1.2 APPLICABLE STANDARDS

## Air Filter Performance Report for Extended Surface Filters:

- A. Submit a test report for each type of filter being offered. The report shall be less than two years old and have been prepared by an independent testing laboratory using test equipment, method and duct section as specified by ASHRAE Standard 52.2-1999 for type filter under test and acceptable to ENGINEER, indicating that filters comply with the requirements of this specification. Test for 500 fpm will be accepted for lower velocity filters provided the test report of an independent testing laboratory complies with all the requirements of this specification.
  - 1. Selection procedures for manufacturer's standard products: All filters tested shall have been procured by the independent testing laboratory from the open market independent of manufacturer of these filters and a statement to this effect must accompany test report.
  - 2. Selection procedures for new products not available on open market: Testing laboratory will certify that filters are not available in areas remote from manufacturer's facilities. For each required test the independent Testing Laboratory shall select from the manufacturer's stock or production the number of samples required. The samples selected shall be representative of standard production considering media utilized and manufacturing locations. These test reports shall be less than six months old.
- B. Filter Supplier Warranty for Extended Surface Filters: Guarantee the filters against leaks, blow-outs, and other deficiencies during their normal useful life. Defective filters shall be replaced at no cost to the Owner.
- C. Identification: Each filter shall bear markings indicating manufacturer's name, filter size, and MERV & MERV-A ratings per ASHRAE Standard 52.2.
- D. Definitions and Abbreviations
  - 1. Spares: Filter(s) in sets to be turned over to the OWNER at the end of the project for the OWNER'S use after the project or any portion thereof, is complete.
  - 2. Construction Period: This term generally includes the time period beginning with the OWNER'S notice-to-proceed and ending with the OWNER'S final acceptance of a project, or any phase of a project.

3. Temporary: A term generally depicting the use of air filters for use during the construction period.
4. Filter Grille: An inlet device connected to an HVAC system where an air filter is to be installed and maintained during construction and permanently after project is completed.
5. Pleated Filters: An extended surface filter with folds of air filtration media.
6. Filter or Filter Set: Air filter(s) in sizes as recommended by equipment or supplier manufacturer to prevent air bypass and to provide the maximum face size and minimum velocity to promote longer filter life expectancy.
7. F/G: fiberglass

### 1.3 RESPONSIBILITY

- A. The CONTRACTOR is responsible for providing, monitoring and maintaining all air filtration specified provisions during the construction period.
- B. The CONTRACTOR is also responsible for providing spare sets of air filter(s) to the OWNER, labeled and in boxes for storage, for the OWNER'S use after the project is complete and at which time the OWNER assumes control of operation and maintenance functions for the systems. One of the filter spare sets shall be installed on the day of the final inspection by the PROFESSIONAL.

### 1.4 AIR FILTRATION PROTECTION REQUIRED

The following systems and installations shall be provided with proper air filtration prior to startup or use of the facilities new HVAC systems and existing or renovated HVAC systems in the area(s) affected by this project.

- A. All new air handling systems, including up-flow/horizontal furnaces, roof top packaged systems, outdoor air and heat recovery systems, blower coil, central station and built-up air handling system with water, or refrigerant coils.
- B. Filter grilles or registers.
- C. Filters in fan systems serving kitchen hoods and other makeup air arrangements.
- D. Ducted return air systems: Provide temporary air filtration over all return air grilles, registers and filter grilles (in addition to filters in frame of filter grille).

### 1.5 TYPE OF AIR FILTRATION REQUIRED

The following is a listing of generic equipment and installation air filtration requirements. The CONTRACTOR may submit alternate filter thickness(es) to match specific applications but shall not be less than that listed, for PROFESSIONAL'S approval. The CONTRACTOR shall verify size, including thickness matched to CONTRACTOR supplied equipment and air distribution device accessory.

AIR FILTRATION REQUIREMENTS					
GENERAL INFORMATION			CONSTRUCTION PERIOD FILTRATION	SPARES (PROJECT COMPLETION FILTRATION)	
FILTER FUNCTION/ LOCATION	FILTER TYPE	NOMINAL FILTER DEPTH/ THICKNESS	MINIMUM MERV & MERV-A RATINGS	MINIMUM MERV & MERV-A RATINGS	NUMBER OF SETS REQUIRED
RETURN AIR GRILLES/ REGISTERS	PLEATED	1"	11	N/A	N/A
KITCHEN FAN PACKAGE W/ SUPPLY (KFP'S & MUA'S)	PLEATED	2"	8	8	3
ROOFTOP UNITS, LARGER THAN 5 TONS, (RTU'S)	PLEATED	2"	8	8	3

**PART 2 – PRODUCTS**

**2.1 EXTENDED SURFACE AIR FILTERS**

- A. Filter shall be pleated, disposable type. Filter shall consist of non-woven cotton and synthetic fabric media, media support grid and enclosing frame.
- B. The filter shall be listed by Underwriters Laboratories as Class 2.
- C. The media support shall be a welded wire grid with an effective open area of not less than 96%. The welded wire grid shall be bonded to the filter media to eliminate the possibility of media oscillation and media pull away.
- D. The enclosing frame shall be constructed of a rigid, heavy-duty beverage board with diagonal support members bonded to each side of the filter to insure pleat stability. The inside periphery of the enclosing frame shall be bonded to the filter pack to eliminate possibility of air bypass.
- E. Filter Characteristics

MINIMUM EFFICIENCY REPORTING VALUE (MERV & MERV-A)	FILTER DEPTH/ THICKNESS	PRESSURE DROP (IN. W.G. @ 350 F.P.M.)		PRESSURE DROP (IN. W.G. @ 500 F.P.M.)	
		INITIAL	FINAL	INITIAL	FINAL
8	1"	0.23	0.5	-	-
8	2"	-	-	0.29	0.75
11	1"	0.30	0.50	-	-
11	2"	-	-	0.35	0.75

**2.2 FIBERGLASS BULK MEDIA**

- A. Filter media shall consist of a continuous filament fiberglass of graduated density. Media shall include a skin on the leaving air side. Furthermore, the media shall be treated with a non-toxic, non-flammable, odor free adhesive.
- B. The filter shall be listed by Underwriters Laboratories as Class 2.
- C. The filter media shall be 1" thick.

- D. This filter media is intended to be utilized over return air grilles, registers and/or open ductwork during the construction period when the systems are being operated. This filter media is NOT to be utilized inside the housing of any HVAC systems.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION AND COORDINATION

- A. Install supports, filters and gages in accordance with manufacturer's instructions.
- B. At end of project, provide list of all HVAC air handling equipment and filter grilles, with size and quantity of air filters and MERV rating for each, and submit for Owner's future use and maintenance record. Furthermore, submit a letter signed by the OWNER acknowledging receipt of all spare sets of air filters outlined above. All boxes of air filters shall be labeled to match the individual HVAC system or return air filter grille location for which the filters are to be utilized.

#### 3.2 START-UP AND TEMPORARY USE

- A. Clean and vacuum air handling units and plenums to the satisfaction of the ENGINEER prior to starting air-handling systems.
- B. Change out replaceable air filters, as filters are 60% loaded during construction use period and just prior to OWNER'S acceptance of project. Filters for use during construction period are in addition to OWNER'S spare sets, as specified herein.
- C. Thoroughly wash wall unit filters as filters are 40% loaded during construction period, and just prior to OWNER'S acceptance of project.

END OF SECTION

## SECTION 230890 - DUCTWORK

## PART 1 – GENERAL

## 1.1 SCOPE

- A. Provide all material, equipment and labor, etc., required including all supply, return, outside air, exhaust, and other ductwork and as required for the A/C system, including mains, branches, plenums, mixing boxes, fittings, accessories, and other related sheet metal work for a complete installation as specified herein and/or shown on Drawings.
- B. Work under this Section includes but is not necessarily limited to the following items: Ductwork for heating, ventilating and air conditioning systems.
- C. Construct ductwork to meet all functional criteria defined in the SMACNA “HVAC Duct Construction Standards - Metal and Flexible” Latest Edition. This shall be subsequently referred to as the SMACNA Manual.

## 1.2 APPLICABLE STANDARDS

APPLICABLE PUBLICATIONS: The publications listed below form a part of this Specification to the extent referenced. The publications are referenced in the text by the basic designation only.

- A. National Fire Protection Association (NFPA):
  - 1. 90A.....Air Conditioning and Ventilating Systems – Latest Edition
  - 2. 90B..... Warm Air Heating and Air-Conditioning Systems – Latest Edition
  - 3. 96.....Vapor Removal from Cooking Equipment – Latest Edition
- B. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):
  - 1. Low Pressure Duct Construction Standards – Latest Edition
  - 2. Guidelines for Welding Sheet Metal – Latest Edition
  - 3. Duct Liner Application Standard – Latest Edition

## 1.3 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. Exposed Duct: Exposed to view in a finished room or outdoors.

## 1.4 QUALITY ASSURANCE

- A. The CONTRACTOR must comply with the enclosed specification in its entirety.
- B. At the discretion of the PROFESSIONAL, sheet metal gauges, reinforcing and sealant may be checked at various times during the construction period to verify all duct construction is in compliance.
- C. If during site observations the PROFESSIONAL finds changes have been made without prior approval, the CONTRACTOR will correct deficiencies identified to comply with this specification solely at the CONTRACTOR’s expense.
- D. Duct penetrations and/or doors, etc., necessary for the PROFESSIONAL to observe

the duct installations, shall be made/installed and repaired, etc. by this CONTRACTOR, in ductwork as selected by PROFESSIONAL, at no additional cost to the OWNER or PROFESSIONAL.

- E. All ductwork shall be installed un-insulated (except duct liner), subsequently sealed and observed/approved by PROFESSIONAL prior to insulating.

PART 2 – PRODUCTS

2.1 DUCTWORK PRESSURE CLASS CONSTRUCTION REQUIREMENTS

- A. Ductwork shall be constructed to meet or exceed the SMACNA Standards based upon the following table of ductwork type and function.

DUCTWORK FUNCTION	DUCTWORK TYPE	DUCTWORK PRESSURE CLASS (IN. W.G.)
Low Pressure Supply Air	Rectangular	2 (pos.)
Low Pressure Supply Air	Round or Oval	2 (pos.)
Low Pressure Return Air	Rectangular	2 (neg.)
Low Pressure Return Air	Round or Oval	2 (neg.)
Low Pressure Exhaust Air	Rectangular	2 (neg.)
Low Pressure Exhaust Air	Round or Oval	2 (neg.)
Kitchen Hood Exhaust	Rectangular	2 (neg.)

2.2 RECTANGULAR DUCTWORK

- A. General Requirements

1. Construct all rectangular ductwork with approved new prime G-90 or better galvanized steel sheet ASTM S27 (LFQ) with chemical treatment or as specified, with careful, neat, and accurate workmanship and with all joints and seams air tight. Longitudinal seams, transverse joints and bracing, sheet metal gauges and other construction details shall be as recommended in the latest edition of the ASHRAE Guide and SMACNA "HVAC Duct Construction Standards – Metal and Flexible", and as specified below.
2. **The rectangular duct sizes as indicated on the Drawings are inside dimensions, or net free area.** All necessary allowances should be made in the sizes shown on the Drawings to accommodate internal insulation or acoustic lining.
3. All ductwork shall be provided with any re-enforcements factory installed to meet the SMACNA pressure classifications listed in paragraph 2.01.
4. Transitions shall have a ratio of at least 4 to 1 except where prevented by job conditions. In such case the transition shall be made as gradual as possible.
5. All duct transitions from square to round shall be smooth square-to-round transitions. Spin-in fittings at the end of capped ducts are not acceptable.
6. Flanged (TDC or TDF) ductwork with reinforced gasketed joints shall be installed in the following applications:
  - a. Indoor ductwork with any dimension greater than 30 inches.



- b. All indoor ductwork exposed to view regardless of size.
    - c. All outdoor ductwork regardless of size.
  7. Rectangular ductwork exposed to weather shall be crowned to shed water.
- B. Low Pressure Ductwork
  1. Elbows shall be either mitered or radius type for 90 degree turns and radius only for all turns less than 90 degrees as indicated on the Drawings.
  2. Mitered elbows shall be constructed using turning vanes in each mitered 90 degree turn. Turning vanes shall be galvanized steel of double-wall air foil design. Where ductwork is greater than or equal to 12" in the plane of the turn, install turning vanes with 4" minimum radius of curvature on a maximum of 4" centers. Where ductwork less than 12" in the plane of the turn, install turning vanes with 2" minimum radius of curvature on a maximum of 2" centers.
  3. Curved elbows shall have a centerline radius of 1-1/2 times the cross-sectional dimension of the duct in the plane of the turn.
  4. All rectangular branch connections to rectangular ducts shall be a lateral or radius type and include an externally adjustable factory fabricated air turning vane assembly. Where lateral types are installed, the length of the lateral shall be equal to one quarter of the duct width but in no case less than 4". Where radius types are installed, the centerline radius shall be 1-1/2 times the branch duct dimension in the plane of the turn.

### 2.3 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. Duct liner shall meet all of the following requirements and include independent testing lab verification of conformance with all of the following product characteristics.
  1. Duct liner shall be made of spun or flame attenuated fiberglass with a factory-applied edge coating and of thickness and density based upon the application listed below.
    - a. Indoor applications – 1" thick, 1-1/2 pcf density.
    - b. Outdoor applications – 1-1/2" thick, 1-1/2 pcf density.
  2. The thermal conductivity shall be equal to or less than 0.25 at 75 degree F. mean temperature.
  3. The liner shall meet the Life Safety Standards as established by NFPA 90A and 90B and shall not support microbial growth as tested in accordance with ASTM G21 and G22.
  4. The duct liner shall conform to the requirements of ASTM C 1071, with an NRC not less than 0.70 as tested per ASTM C 423 using a Type "A" mounting.
- B. Comparable Products
  1. Knauf "Ductliner EM"
  2. CertainTeed "Toughgard"
  3. Johns Manville "Linacoustic RC".

## 2.4 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK

- A. Concealed round ductwork shall be constructed with SMACNA minimum pressure classification of 2" w.g.
- B. Snap lock pipe is acceptable as long as all longitudinal and circumferential seams are sealed and screws as indicated in Part 3 - Execution.
- C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.

## 2.5 SPIRAL DUCTWORK

- A. General Requirements
  - 1. Provide all ductwork as indicated Drawings.
  - 2. All ductwork shall be provided with any re-enforcements factory installed to meet the SMACNA pressure classifications listed in paragraph 2.01.
  - 3. All exposed to view ductwork indicated to be painted shall include a factory paint grip finish.
  - 4. Galvanized areas that have been damaged by welding shall be coated with corrosion resistant paint.
  - 5. All duct and fittings shall be manufactured by the same company. Said company shall have been in the business of manufacturing spiral ductwork for at least ten years.
  - 6. Manufacturer shall furnish ENGINEER certified copies of test data made by an independent laboratory covering all pipe and fittings.
- B. Single Wall Circular and/or Flat Oval Type:
  - 1. Spiral pipe shall have locked seams so made as to eliminate any leakage under the pressures for which the system shall be subjected.
  - 2. Longitudinal seam duct shall have a fusion welded butt seam.
  - 3. All fittings shall have continuous welds along all seams. All divided flow fittings shall be manufactured as separate fittings, not as tap collars welded into spiral duct sections.
  - 4. Transitions shall have a ratio of at least 4 to 1 except where prevented by job conditions. In such case the transition shall be made as gradual as possible.
  - 5. Elbows shall be fabricated to a center-line radius of 1.5 times the cross-section diameter. Elbows in diameters 3" through 12" shall be die stamped true radius type. All other elbows shall be gored construction with all seams continuously welded.
  - 6. All 90 degree tees and 45 degree laterals shall have a radius entrance into the tap, produced by machine or press forming. The entrance shall be free of weld build-up, burrs or irregularities.
  - 7. Pipe to pipe and pipe to fitting joints shall be by the use of fully welded angle/flanged connections. Bolt hole spacing for angle rings shall not exceed 6-inches. Neoprene gaskets or other suitable sealant shall be employed in the joining method.

- C. Insulated Double Wall Circular and/or Flat Oval type:
1. The outer pressure sheet and the inner liner shall be manufactured from galvanized steel meeting ASTM A-527-67, separated by spaces.
  2. The inner liner of all ductwork and fittings shall be perforated.
  3. The construction is to include minimum insulation sandwiched between outer shell and inner liner to provide a thermal conductivity "K" factor of 0.27B/HR/sq.ft./in./degrees F. at 75 degrees mean temperature.
  4. The construction shall have means to maintain positive concentricity of liner with shell and mechanical means to retain insulation against dislocation by assembly process. Adhesives of any type are prohibited unless the flame spread, smoke developed and sound attenuation tests were performed with the adhesives as used.
  5. The insulation shall include a matte face to provide positive protection against the possibility of fiber entrainment and microorganism growth with independent test lab certification of compliance with ASTM G21 and G22.
  6. Spacers shall be included between inner and outer sheet metal members to prevent liner insulation compression.
  7. Outer wall construction shall meet or exceed all of the requirements listed herein for single wall round oval ductwork.

## 2.6 FLEXIBLE AIR DUCTWORK

- A. Insulated Flexible Air Duct: Factory made including mineral fiber insulation with maximum C factor of 0.16 (R=6) at 75 degrees F. mean temperature, encased with a low permeability moisture barrier metalized outer jacket, having a puncture resistance of not less than 50 Beach Units. Acoustic insertion loss shall be not less than 3db per foot of straight duct, at 500 Hz, based on 6-inch duct, air velocity at 2500 fpm.
- B. Flexible ducts shall be listed by Underwriters Laboratories, Inc., complying with UL 181. Ducts larger than 8-inches diameter shall be Class 1. Ducts 8-inches in diameter and smaller may be Class 1 or Class 2.
- C. Minimum working pressure for low and medium pressure systems: 6 inches w.g. positive, 2 inches w.g. negative.
- D. Duct Clamps
1. Stainless steel strap with cadmium plated worm gear tightening device.
  2. Nylon tie wrap minimum 1/4" wide.

## 2.7 FLEXIBLE DUCTWORK ELBOW SUPPORTS

Elbow supports shall be constructed of durable composite material and be fully adjustable to support flexible duct diameters 6" – 16". Elbow supports shall be UL listed for use in return air plenum spaces. Flexible ductwork elbow supports equal to Thermaflex FlexFlow Elbow.

## 2.8 JOINT SEALING

- A. Sealant: Elastomeric compound, gun or brush grade, maximum 25 flame spread and 50 smoke developed (dry state) compounded specifically for sealing ductwork. Use products as recommended by the manufacturer for low, medium or high-

pressure metal duct systems.

- B. Tape/Gaskets in flanged joints such as TDC or TDF: Soft butyl rubber/elastomeric composition equal to Sticky Tape manufactured by Ductmate.

## 2.9 SPECIAL DUCTWORK:

- A. Kitchen and Grill Hood (Ventilator) Exhaust Ducts: Comply with NFPA 96.
  - 1. Material: 16 gauge black steel in concealed areas. Use 18 Gauge stainless steel for exposed duct in occupied areas.
  - 2. Construction: Liquid tight with continuous external weld for all seams and joints.
  - 3. Duct access door system shall be compliant with ASTM E 2336 for fire rating required as a part of fire wrap system specified in Section *Mechanical Insulation*.
- B. Wet Air Exhaust Ducts and Accessories: Ducts for dishwashers, and associated hoods, etc., shall be minimum 18 gauge stainless steel of #4 finish where exposed to view in finished spaces and 2B finish where concealed. All duct shall be made liquid tight with continuous external weld for all seams and joints.

## PART 3 – EXECUTION

### 3.1 GENERAL INSTALLATION REQUIREMENTS

- A. Comply with provisions of Section, *BASIC MECHANICAL MATERIALS AND METHODS*, particularly regarding coordination with other trades.
- B. Fabricate and install ductwork and accessories in accordance with referenced SMACNA Standards and manufacturer's printed instructions.
- C. Fabricate ductwork based on field measurements of space available. Sizes on plans may be altered by the CONTRACTOR, when approved by the ENGINEER, to other dimensions without increasing air pressure friction losses where necessary to avoid interferences and clearance difficulties.
- D. All ductwork located outdoors shall be sealed water tight on all seams and connections.
- E. Provide duct transitions, offsets and connections to dampers, coils, and other equipment.
- F. Weld sheet metal in accordance with SMACNA, Guidelines for Welding Sheet Metal. Repair damaged galvanized areas with galvanizing repair compound.
- G. Each collar for outlet and intake devices on exposed ducts shall be flanged inward at the device mounting end, and the outside dimensions of the collar shall not be less than the overall flange dimensions of the devices attached thereto.
- H. At each location where exposed ductwork passes through finished walls, floors, or ceiling, install a neat sheet metal collar completely covering the rough opening in the building construction secured to ductwork with sheet metal screws.
- I. Provide UL approved flexible connectors per Section *Mechanical Sound and Vibration Control*.
- J. Construct casings, eliminators, and pipe penetrations in accordance with applicable SMACNA Standards. Design casing access doors to swing against air pressure so

the pressure helps to maintain a tight seal.

- K. Install fire, smoke and combination fire/smoke dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test.
- L. Where diffusers, registers and grilles cannot be installed to avoid seeing inside the duct, or items and other installations above the ceiling through plenum grilles, paint the inside of the duct or above ceiling installations, with flat black paint to reduce visibility.
- M. Protection and Cleaning
  - 1. Adequately protect ductwork and equipment against physical damage and entry of foreign matter to the inside at all times both prior to and after installation into project.
  - 2. Cap open ends of ducts and equipment when not in operation.
  - 3. Clean ductwork and equipment prior to painting. See PAINTING section for specific requirements pertaining to surface preparation.
  - 4. Both the inside and outside of all ductwork and equipment shall be clean and free of dust, debris, foreign material, etc. prior to final acceptance of the project.
  - 5. Place equipment in first class operating condition, or return to source of supply for repair or replacement, as determined by PROFESSIONAL.
- N. Control Damper Installation:
  - 1. Provide necessary transitions required to install dampers which do not match the duct size indicated.
  - 2. Assemble multiple section dampers with required interconnecting linkage and extend required number of shafts through duct for external mounting of damper motors.
  - 3. Provide necessary sheet metal baffle plates to eliminate stratification and provide air volumes specified. Locate baffles by experimentation, and affix and seal permanently in place, only after stratification problem has been eliminated.

### 3.2 INTERNAL INSULATION (DUCT LINER) FOR RECTANGULAR DUCTWORK

- A. The following rectangular ductwork shall be interior acoustically lined:
  - 1. Ductwork within ten (10) feet of any supply or return fan for HVAC applications, except built-up R/A plenums.
  - 2. Ductwork within ten (10) feet of exhaust fans.
  - 3. Ductwork exposed to view indoors.
  - 4. Supply and Return ductwork located outdoors.
  - 5. Transfer air ductwork and plenums.
  - 6. Supply air plenums adjacent to air moving equipment, etc.
  - 7. Ductwork associated with kitchen make-up supply unit shall **NOT** be interior lined.

8. Where specifically indicated on Drawings.
    - B. The duct liner shall be applied to the flat sheet with 100% coverage of adhesive with the black matte surface facing the air stream.
    - C. Ducts with the sides or bottom dimension exceeding 20" shall have the liner additionally secured with welded pins and speed clips or "Gripnails" on a maximum of 12" centers and within 3" of edges. Pins shall be cut close to the speed clips.
    - D. Provide sheet metal nosing on all liner, where liner terminates and ductwork continues.
    - E. All seams, exposed edges and leading edges of all longitudinal and cross-joints of the liner shall be coated with an approved white sealant "butter".
    - F. Wet butter shall also be applied to duct to duct seams and connections simultaneously with the jobsite installation.
- 3.3 LONGITUDINAL SEAM ROUND LOW PRESSURE DUCTWORK
- A. Screws shall be installed every 18" O.C. along longitudinal seams and minimum 6" from end connections
  - B. Screws shall be installed every 4" on center, but not less than 4 equally spaced, on circumferential ductwork and fitting joints.
  - C. All elbows and fittings shall be factory fabricated items by the same manufacturer as ductwork. Wye and laterals at diffusers take-offs shall be factory fabricated.
  - D. No dovetail field joints or fittings are allowed.
- 3.4 SPIRAL DUCTWORK
- A. Spun bell mouth connections shall be installed at each round take off from rectangular ductwork and/or plenums.
  - B. Duct sealer shall be applied to the male end of the couplings and fittings. After the joint is slipped together, sheet metal screws shall be placed 1/2-inch from the joint head for mechanical strength. Sealer shall be applied to the outside of joint extending 3" on each side of the joint head and covering the screw heads.
- 3.5 FLEXIBLE AIR DUCTWORK
- A. Flexible ducts shall be installed with stainless steel strap or nylon tie wraps with sealant and as approved for UL 181, Class 1 installation. A "tightening gun" shall be utilized when installing nylon tie wraps.
  - B. Flexible ducts shall not penetrate any wall, floor, partition or ceiling.
  - C. Flexible duct shall be installed in continuous single pieces not over five (5') feet long, as straight and short as feasible, adequately supported.
  - D. Centerline radius of bends shall be not less than two duct diameters.
  - E. Flexible ductwork shall be suspended on 36" centers with a minimum 1-1/4-inch wide flat banding material.
- 3.6 JOINT SEALING
- A. **All ductwork joints and longitudinal seams shall be sealed airtight.** Sealant shall be visibly sealed on the exterior of duct, including all factory fittings, all connections, both longitudinal and circumferential.

- B. Duct tape (gray or foil type) shall NOT be utilized as a ductwork sealer.
- C. Elastomeric or hard cast duct sealer shall NOT be utilized on fire damper sleeve to duct connections.
- D. Utilize flanged style ductwork joining system in conjunction with tape/gasket for sealing breakaway joints and connections to fire, smoke and/or combination fire/smoke dampers.

### 3.7 SPECIAL DUCTWORK

- A. Kitchen Hood and Dishwasher Exhaust Ductwork
  - 1. Grind all welds smooth and polish in exposed to view installations.
  - 2. Provide gaskets approved by equipment manufacturer at flanged connections.
  - 3. Install ducts on slope to drain back to equipment served. Where ducts are not self-draining back to the equipment, provide low point drain pocket with copper drainpipe to sanitary sewer.
  - 4. Provide access doors or panels for duct cleaning in side of duct at drain pockets, at 20 foot intervals, and at each change of direction.

### 3.8 DUCT LEAKAGE TESTS AND REPAIR

- A. ALL ductwork shall be sealed airtight, as specified herein. Designated ductwork, as hereafter identified, shall be field pressure tested and proven tight. Other ductwork, not specified to be field tested may be randomly inspected by PROFESSIONAL; any or all ductwork not found to be comprehensively sealed (by visual inspection) may be thereafter required to be field pressure tested, solely at PROFESSIONAL'S discretion, to prove air tightness to specified tolerances.
- B. The following ductwork shall be tested by the CONTRACTOR and witnessed and logged by a representative of the TAB Agency performing the work identified in Section *Testing, Adjusting and Balancing*. This includes all supply, return, exhaust, outside air, etc. trunk and all branch ducts, and plenums excluding flexible duct run-outs to individual air distribution devices, shall be tested and proven tight within specified tolerances.
  - 1. All Low Pressure Ductwork.
    - a. Exceptions:
      - i. Ductwork within an above ceiling return air plenum or space utilized as a plenum.
      - ii. Ductwork connected to HVAC equipment with two (2) or less outlets/inlets.
    - b. Test pressure shall be at pressure class construction requirements identified in Part 2 of this specification.
  - 2. Kitchen Hood Exhaust Ducts.
    - a. Test pressure shall be at pressure class construction requirements identified in Part 2 of this specification.
- C. Measured air quantity leakage test

1. The CONTRACTOR shall use recently calibrated orifice run, manometers and portable blower as recommended by AABC.
2. Instruments used for testing and balancing of system shall have been calibrated within six months preceding tests and checked for accuracy prior to start of work.
3. Instruments shall be of a type normally recognized as adequate and accurate for the test contemplated. List type of instrument, manufacturer, serial number and latest calibration date as a part of the submitted test data.
4. Allowable Leakage
  - a. Low Pressure Ductwork shall have a maximum leakage of five (5) percent of design flow rate (cfm) for complete system or portions thereof. Summation of leakage for all sections shall not exceed the total allowable for a single system.
  - b. Kitchen and Grill Hood (Ventilator) Exhaust Ducts shall have 0% leakage.
5. Verification: By TAB Agency. See attached Duct Test Log.



DUCT TEST LOG						
DATE	SYSTEM	LOCATION OF TEST	TEST PRESSURE	ACTUAL LEAKAGE (CFM)	RESULTS % OF LEAKAGE	TAB WITNESSED (INITIALS)
Remarks: (Include Narrative of Procedure, List of Instrumentation, Last Calibration Date, etc.)						
Note: Turn in all forms filled out with project closeout documentation. Copy this form if more sheets are needed. These forms and/or log shall be kept at jobsite and upon request made available to ARCHITECT and/or PROFESSIONAL.						

I certify that the data listed above is accurate and was witnessed by myself or qualified employees of the TAB Agency.

\_\_\_\_\_

TAB Agent

END OF SECTION

\_\_\_\_\_

Date



## SECTION 230910 - DUCTWORK ACCESSORIES

### PART 1 – GENERAL

#### 1.1 SCOPE

Ductwork accessories for HVAC including supply air, return air, outside air, transfer air and general exhaust systems.

#### 1.2 APPLICABLE STANDARDS

- A. Refer to Paragraph, *QUALITY ASSURANCE*, in Section *BASIC METHODS AND REQUIREMENTS (MECHANICAL)*.
- B. Fire Safety Code: Comply with NFPA 90A
- C. Duct System Construction: Referenced SMACNA Standards are the minimum acceptable quality.
- D. Duct accessories exposed to the air stream, such as dampers turning vanes, extractors, etc. and access openings, shall be of the same material as the duct or provide at least the same level of corrosion resistance.

#### 1.3 DEFINITIONS

- A. Seal or Sealing: Use of liquid or mastic sealant, with or without compatible tape overlay, or gasketing of flanged joints, to keep air leakage at duct joints, seams and connections to an acceptable minimum.
- B. SMACNA duct pressure classification for Low Pressure: Static pressure rating up to 2 inches wg (water gauge), positive or negative, for rectangular ducts, and 1 inch wg for round ductwork.

### PART 2 – PRODUCTS

#### 2.1 TAKE-OFF FITTINGS

- A. Round ductwork take-offs shall be conical/bellmouth type or 45 deg lateral (shoe-tap) type. Provide take-offs with volume damper including continuous shaft, locking quadrant handle, nylon bushings and stand-off bracket. Located where indicated and accessible.
- B. Conical take-off fittings shall be equal to Flexmaster model CBD SOG with B03 option.
- C. 45 deg lateral (shoe-tap) take-off fittings shall be equal to Flexmaster model STOD with B03 option.

#### 2.2 DAMPERS

- A. Rectangular Volume Dampers: Opposed blade, multi-louver type. Provide end bearing for all dampers. Quadrant or other operator for externally insulated duct shall have stand-off mount so operation is clear of the insulation.
- B. Backdraft Dampers: Self-operating, multi-blade damper to open fully on 0.06 inch wg pressure difference and close by gravity. Aluminum, 16 gauge frame, 0.023 inch blades of airfoil or elliptical shape, with tie-bar to connect blades for parallel operation. Provide resilient gasket for air seal and quiet operation. Blade pivots shall be in nylon bushings. Provide adjustable counter-balance weight(s) where indicated or required to achieve specified performance.

## 2.3 DUCT ACCESS DOORS, PANELS AND SECTIONS

- A. Provide access doors, sized and located for maintenance work, upstream where possible, in the following locations:
  - 1. Each fire damper (for link service), fire/smoke damper, smoke damper and automatic control damper.
  - 2. Each duct mounted smoke detector.
  - 3. Each duct mounted coil.
  - 4. Each turn in grease ducts.
- B. Openings shall be as large as feasible in small ducts, 8" diameter minimum, with round spin-in access door and sash lock(s). Access sections in insulated ducts shall be double wall, insulated.
  - 1. For low and medium pressure rectangular ducts, provide Flexmaster Model SDSM with R6 insulation option, flange with stick on gasket and cable door retention accessories.
  - 2. For round and flat oval ducts provide Ruskin Model ADR.

## 2.4 SMALL WALL BRICK VENTS

Extruded aluminum with galvanized welded wire screen (square opening size to be 1/4" for intake and 1/2" for exhaust/relief applications) and factory baked enamel colored finish (color as selected by ARCHITECT) as Greenheck Model BVE or BVF (as approved by Architect for wall type) with wall sleeve. Provide brick vent with integral opposed blade balancing damper (adjustable from exterior) on O/A intake applications, and backdraft damper (where noted on drawings).

## 2.5 AIR DISTRIBUTION DEVICES

- A. Including supply, return, transfer and exhaust ceiling, floor and sidewall installation, aluminum gasketed construction as indicated. Provide steel construction and matching UL Listed ceiling radiation damper on applications in fire rated ceiling assemblies.
- B. All inside ceiling units shall have factory finish, white color unless otherwise noted.
- C. All soffit outdoor units shall have factory finish, color to match soffit. Submit color chart to ARCHITECT for custom color selection.
- D. See Schedule on Drawings for more information.

## 2.6 PREFABRICATED ROOF CURBS

- A. Roof curbs for concealed applications, where curb is essentially hidden on flat/low slope roof (built up, modified bitumen, etc.) may be galvanized steel construction.
- B. All roof curbs to be provided with continuous welded corner seams and treated wood nailer. Curbs shall be built for pitched roof or ridge mounting as required to keep top of curb level.
- C. Up-blast kitchen hood exhaust fan discharge outlet shall be minimum 40 inches above roof surface or as required to comply with NFPA 96.
- D. See details on Contract Drawings for more information.

## PART 3 – EXECUTION

### 3.1 INSTALLATION

- A. Comply with provisions of Section *BASIC MECHANICAL MATERIALS AND METHODS*, particularly regarding coordination with other trades.
- B. Construct casings, eliminators, and pipe penetrations in accordance with LPDS, Chapter 3. Design casing access doors to swing against air pressure so the pressure helps to maintain a tight seal.
- C. Install duct hangers and supports in accordance with SMACNA, LPDS, Chapter 5, and HPDS, Chapter 6, in concealed applications.
- D. Install life safety dampers in accordance with the manufacturer's instructions to conform to the installation used for the rating test. Install multiple access doors to provide access to all damper linkages/fusible links of multiple section life safety dampers.
- E. Seal openings around duct penetrations of fire rated ceilings and partitions with fire stop material as required by NFPA 90A. See Section *Basic Mechanical Materials and Methods*. Provide sound sealant around duct penetrations in wall indicated as sound and/or full height walls.
- F. Provide primary and secondary balance dampers on all supply distribution devices. Provide a supply air duct damper and air extractor off main ductwork to branch ductwork of the types as listed below:
  - 1. Round Ductwork: Provide conical or lateral type taps with integral butterfly damper. Submit information for approval.
  - 2. Rectangular Ductwork: Provide radius or lateral elbow tap, as indicated with air extractor assembly and opposed blade multi-blade damper.
  - 3. Provide exterior duct damper and extractor controller arm assemblies that extend past proposed ductwork installation for accessible operation.
- G. When splitter dampers occur above other than lay-in ceiling, provide damper assembly complete with supports, bearings, chromium plated ceiling escutcheons and adjustable regulator, as Young Models No. 1 and No. 890-A.

END OF SECTION



## SECTION 230980 - CONTROLS AND INSTRUMENTATION

## PART 1 – GENERAL

## 1.1 DESCRIPTION

- A. Provide complete HVAC controls and instrumentation for the following items:
  - 1. Air Handling Systems Including:
    - a. Kitchen Hood Systems
    - b. Exhaust Fans
    - c. Direct Expansion Systems
  - 2. Miscellaneous
    - a. Wall Heaters
- B. Definitions:
  - 1. Deviations: The difference between the controller set point and the value of the controlled variable (such as room temperature) at any instant.
  - 2. Dead band: A temperature range over which no heating or cooling energy is supplied, such as 72-78 degrees F, i.e., as opposed to single point changeover or overlap.
  - 3. Control Wiring: Includes conduit, wire and wiring devices to install complete HVAC control systems including motor control circuits, interlocks, thermostats, switches and like devices.

## 1.2 QUALITY ASSURANCE

- A. Criteria:
  - 1. The maximum deviation of occupied room conditions from the controller set point shall not exceed plus or minus one degree F for temperature, and plus or minus three percent for relative humidity unless the system is operating in the dead band range.
- B. Performance tests:
  - 1. Demonstrate to the Owner that all controls are installed, adjusted, and can perform all functions required by the contract drawings and specifications.

## 1.3 SUBMITTALS

- A. Manufacturer's Literature and Data for all components, including the following:
  - 1. Controllers.
  - 2. Relays and switches.
  - 3. Control dampers, control valves and operators.
  - 4. Instrumentation products.
- B. Certificates:
  - 1. Compliance with paragraph, QUALITY ASSURANCE.
  - 2. Name and address of a permanent service organization maintained or trained by the manufacturer that will render satisfactory service within eight

hours after notification that service is required.

- C. Control Drawings: Integrate with flow diagrams; show outlines of HVAC equipment with control devices, schematic one line control piping and wiring, and written sequence of operation and operation instructions. Equipment numbers shall correspond to those shown on the Contract Drawings. Provide three (3) complete sets of blue-line as-built drawings.
- D. Operation and Maintenance Manuals:
  - 1. Submit in accordance with Section *Mechanical Close-Out Requirements*.
  - 2. Include the following documentation:
    - a. General description and specification for all components.
    - b. Detailed illustrations and complete calibration procedures.
    - c. Complete trouble shooting procedures and guidelines.
    - d. Complete operating instructions for all systems.
    - e. Piping schematic/flow diagrams.

#### 1.4 INSTRUCTIONS

- A. Instructions to OWNER Operations Personnel: Perform in accordance with Section *Mechanical Close-Out Requirements*.
- B. Training by independent or franchised dealers who are not direct employees of the temperature control company will not be acceptable.

#### 1.5 GUARANTY

Any defects in workmanship or material during the guaranty period shall be corrected by the CONTRACTOR at no cost to the OWNER. Correction of defects shall be accomplished during regular working hours.

### PART 2 – PRODUCTS

#### 2.1 SENSORS AND CONTROLLERS

- A. Combination heating/cooling thermostat:
  - 1. Digital, low voltage, color touch-screen, graphical display, 7-Day programmable autochangeover WiFi. Thermostat shall support up to 2 stages of cooling and 3 stages of heating as well as heat pump configurations. Device shall support remote-mounted space temperature sensors.
  - 2. Remote connectivity and simplified setup shall be provided via mobile application. Mobile application shall include functionality for one-to-many setup and configuration tasks.
  - 3. Operating and storage range of -40 to 175°F and 5 to 95% RH non-condensing.
  - 4. Equal to Trane Pivot Smart Thermostat.
- B. Humidistat: Low voltage or electronic type sensor/controller capable of minimum 2% relative humidity accuracy, and no more than 1% drift per year temperature compensating, non-condensing, early field calibratable, sensor/controller shall



energize humidity control equipment/capability on a rise in space above setpoint. Provide multistage or multiple setpoint humidity sensor/controllers to match equipment scheduled and/or specified capability and/or control.

Duct or Plenum sensing humidity sensor/controllers shall include duct penetration probe or other suitable PROFESSIONAL approved sensing capability, as Johnson Controls HE-67 or as approved.

Space wall mounted humidity sensor/controllers shall be as KELE Series HF/HW-20K-T81 or as approved. Calibration shall be guaranteed for minimum period of two (2) years.

- C. Provide specialty sensor/controllers to match specified sequence of operation as delineated hereafter,
- D. Switches
  - 1. Manual Switches:
    - a. Electric: Provide manual switches as required in the sequence of operation. Switch contact ratings shall be adequate to handle the functions being switched, with minimum rating 15A. at 120 volts.

## 2.2 RELAYS:

- A. Provide as required for system functions.
- B. Electrical Pilot Duty or Contactor Types: Provide inductive rated contacts for circuits with coils, motors or other inductive devices, minimum 120V, 15A. rating.

## 2.3 MOTORIZED CONTROL DAMPERS

- A. Dampers shall be of the airfoil, ultra low leakage, opposed blade design. Dampers shall be constructed of minimum 16 gauge galvanized steel. Side mounted linkage shall be out of airstream. Blades shall include rubber edge seals for tight seal.
- B. Modulating damper actuators shall be a minimum of 40:1 turndown ratio.
- C. Damper actuators shall be two-position normally closed low-voltage type.
- D. Design and install control dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.

## 2.4 FINAL CONTROL ELEMENTS AND OPERATORS

- A. Fail Safe Operation: Design and install control valves and dampers to "fail safe" in either the normally open or normally closed position as required for freeze, moisture, smoke or fire protection.
- B. Spring Ranges: As required for system sequencing and to provide tight close off.

## 2.5 WIRING MATERIALS

- A. Comply with applicable sections of *Division 26 and 28*. Provide wiring for control devices furnished under this Section, HVAC motor control conduits and interlocks. Color code and number all wires, whether individual or in cables, for identification.
- B. A complete wiring system shall be provided for all direct digital control (DDC) and electric controlled apparatus. All wiring shall be installed in a neat, workmanlike manner, of sufficient size and tested to be continuous and without unnecessary "short".

Wiring shall be as follows:

1. Exposed Areas and Mechanical Equipment Rooms: Wiring shall be routed in metallic conduit per *Division 26 and 28* requirements. Provide flexible conduit connections to rotating equipment.
2. Concealed, Accessible Areas: Wiring may be routed outside in above ceiling accessible spaces conduit, however wiring outside conduit shall be sheathed with plenum rated jacket with maximum rating of 50/25 smoke developed/fire rated per NFPA 90A.
  - a. All wiring will be routed in the bar joists and/or roof structure space and supported with tie-straps at maximum 6'-0" on center.
  - b. All drops and risers to HVAC equipment, fans, sensors, etc., will have a tie-strap installed directly above each device to insure a vertical support to the device.
  - c. Any open wiring that enters a conduit in the walls or drop/rise to connect equipment will have a minimum of 12" of wire looped outside the conduit above the ceiling and will be attached utilizing a tie-strap within 12" of the conduit end or connection.
3. Inaccessible Areas: Same as #1 above - includes wiring in walls, above hard ceilings, in chases, etc.
4. Inside Panels or Unit Enclosures: Wiring may be run outside conduit and neatly tied in bundles for neatness and function.
5. Wiring in exterior and moist environments shall be routed in weatherproof liquid tight conduit with matching fittings and connections.
6. Minimum gauge for low voltage (24VAC or less) control wiring shall be 18 AWG copper solid conductor(s).

## 2.6 TAMPERPROOF INSTALLATIONS

- A. All electric type ceiling and/or duct heater(s), low limit thermostats and high limit humidistat sensor/controllers shall be enclosed in a white tamperproof cover, Kenall "Thermo-Gard", or as approved. Provide OWNER with four (4) tamperproof cover screw tools at completion of project. Mount these devices in a location approved by PROFESSIONAL.
- B. Relays for all HVAC systems, exhaust fans, and ceiling heaters shall be mounted in large junction boxes with covers above accessible ceilings near individual equipment.
- C. Designated room thermostats shall be mounted 48" above finished floor behind clear locking removable cover, as Berko. Provide two (2) keys for each and every cover, to OWNER at end of project.

## 2.7 IDENTIFICATION/SIGNAGE

- A. Provide permanent phenolic labels for all operators, controllers, and sensors. Coordinate with ENGINEER on designations required. Submit Shop Drawing of installation indicating switch location(s) and identification. See Section *Mechanical Identification*.

## 2.8 CONTROL SEQUENCES

Control sequences shall be:

### A. PACKAGED HEATING/ELECTRIC COOLING SYSTEMS (WITH INTEGRAL HOT GAS REFRIGERANT COIL FOR HUMIDITY CONTROL)

1. UNIT CONTROLS SHALL BE ENERGIZED FROM THERMOSTAT CONTROLLER LOCATED AS INDICATED ON DRAWINGS.
2. WHEN THE UNIT CONTROLS ARE ENERGIZED, WITH THERMOSTAT FAN "AUTO-ON" SWITCH IS IN "ON" POSITION, EVAPORATOR FAN SHALL RUN CONTINUOUSLY AND ZONE HEATING AND COOLING THERMOSTAT SHALL CONTROL THE HEATING FUNCTION AND CYCLE CONDENSING UNITS TO MAINTAIN ZONE ENVIRONMENT CONDITIONS.
3. UNITS DESIGNATED WILL INCLUDE AND BE DE ENERGIZED BY SMOKE DETECTOR(S) LOCATED IN THE RETURN DUCT/PLENUM AND SUPPLY AIR TRUNK DUCT IF PRODUCTS OF COMBUSTION ARE DETECTED.
4. A ZONE LOCATED HIGH LIMIT HUMIDITY SENSOR/CONTROLLER SET INITIALLY ON 60% RH AND LOW AND HIGH LIMIT THERMOSTAT SETTINGS OF 62 AND 85 DEGREES F. RESPECTIVELY, SHALL AUTOMATICALLY OVERRIDE PROGRAMMABLE THERMOSTAT TIME BASED "NORMAL OCCUPANCY" CONTROL OF ALL ZONE COOLING/HEATING CAPABILITY FOR UNOCCUPIED PERIOD UPPER LIMIT HUMIDITY, MANAGEMENT OF UTILITY USAGE AND/OR FREEZE PREVENTION.
5. DURING UNOCCUPIED PERIODS, SUPPLY FAN SHALL BE CYCLED IN CONJUNCTION WITH A CALL FOR HEATING/COOLING OR DEHUMIDIFICATION.
6. DURING ALL PERIODS, ZONE HUMIDISTAT SHALL ENERGIZE REFRIGERATION CAPACITY AND THERMOSTATIC CONTROLS SHALL CYCLE REFRIGERANT HOT GAS REHEAT AND SEQUENCE GAS VALVE, IN STEPS, AS SECOND STAGE HEATING CAPABILITY, TO MAINTAIN ZONE THERMOSTATIC AND HUMIDITY SETPOINT PER MANUFACTURER'S CONTROLS STRATEGY.
7. PROVIDE INDIVIDUAL EVAPORATOR COIL CIRCUIT FREEZESTAT COMPRESSOR SHUTDOWN AND AUTOMATIC TIME DELAY RESTART CONTROLS ON SYSTEMS SCHEDULED WITH LOW AMBIENT CONTROLS AND ALL UNITS WITH DUAL CIRCUIT EVAPORATORS.
8. WHERE INDICATED ON DRAWINGS, OUTSIDE AIR DAMPER POSITION SHALL BE OVERRIDDEN BY DIFFERENTIAL ENTHALPY ECONOMIZER CONTROLS WHEN OUTSIDE AIR AND RETURN AIR CONDITIONS INDICATE LESS ENERGY IS REQUIRED TO CONDITION OUTSIDE AIR THAN RETURN AIR. OUTSIDE AIR DAMPERS SHALL BE COMPLETELY OPENED PRIOR TO BEGINNING TO MODULATE RETURN AIR DAMPER CLOSED. WHEN CONDITIONS ARE NO LONGER CONDUCTIVE TO ECONOMIZER OPERATION, NORMAL SEQUENCE OF OPERATION SHALL RESUME.

- B. KITCHEN HOOD EXHAUST AND SUPPLY MAKE-UP SYSTEMS:
1. A TOGGLE SWITCH ON HOOD SHALL ENERGIZE EXHAUST FAN, AND WITH INTERLOCKING, SUPPLY AIR MAKE-UP SYSTEM SHALL ALSO BE ENERGIZED, ALONG WITH SUPPLY AIR TEMPERATURE DISCHARGE CONTROLS. UNIT CONTROLS SHALL MODULATE GAS HEATING TO PROVIDE 50 DEGREES F., ADJUSTABLE, SUPPLY AIR TEMPERATURE TO HOOD SUPPLY PLENUM.
  2. UPON ACTIVATION OF HOOD FIRE SUPPRESSION SYSTEM OR FIRE ALARM ANNUNCIATION:
    - a. IF EXHAUST AND SUPPLY FANS ARE OPERATING AT TIME OF ANNUNCIATION, SUPPLY FAN SHALL BE DE-ENERGIZED BUT EXHAUST FAN SHALL CONTINUE TO OPERATE.
    - b. IF EXHAUST AND SUPPLY FANS ARE NOT OPERATING AT TIME OF ANNUNCIATION, BOTH FANS SHALL REMAIN OFF.
  3. SEE SECTION *KITCHEN SUPPLY AND EXHAUST HOOD SYSTEMS* FOR OTHER SAFETY AND SHUTDOWN CONTROLS.
- C. FANS:
1. SEE CONTROL SEQUENCE AT SCHEDULE(S) ON DRAWINGS.
- D. DOMESTIC WATER RECIRCULATING PUMPS
1. SHALL BE ENABLED TO RUN DURING OCCUPANCY AS SENSED BY WALL MOTION SENSOR. WHEN ENABLED, PUMP SHALL BE ENERGIZED WHEN PIPE MOUNTED AQUASTAT FALLS BELOW SETPOINT.
- E. OTHER CONTROLS AND/OR CONTROL FUNCTIONS AS LISTED ON DRAWINGS OR SPECIFIED ELSEWHERE.

### PART 3 – EXECUTION

#### 3.1 INSTALLATION AND ADJUSTMENT

- A. Install and adjust required control components and systems in accordance with instructions of the manufacturer. Work shall be performed by employees of the manufacturer or an authorized representative.
- B. All control wiring shall be routed in accordance with paragraph 2.05 herein. Install control wiring and connections in accordance with applicable Sections of *DIVISION 26 and 28*.
- C. Except for short apparatus connections run conduit parallel to or at right angles to the building structure. Conceal conduit in finished spaces.
- D. Do not run conduit concealed under insulation or inside ducts. Mount control devices and conduit located on ducts or apparatus with external insulation or stand-off support to avoid interference with insulation.
- E. Run wire connecting devices on or in control cabinets parallel with the sides of the cabinet neatly racked to permit tracing. Rack connections bridging a cabinet door along the hinge side and protect from damage. Provide grommets, sleeves or vinyl tape to protect plastic tubing or wires from sharp edges of panels, conduit, and other items.

- F. Provide all necessary factory and/or field labor for complete calibration and adjustment of the air flow control components, and be responsible for setting all control set points, operating sequences, and alarm systems contained within the control center to produce the system performance specified.
- G. Provide water heater controls, operating instructions, controls and piping schematic in neat laminated displays for mounting in water heater room.
- H. CONTRACTOR shall provide all power wiring and connect relays, time clocks, control panels, MCP, etc. which are furnished by CONTRACTOR.
- I. Provide permanent identification of panel MCP, time clock, and all controllers, by zone, etc. as per Section *Mechanical Identification* and PROFESSIONAL'S instruction. Submit details of proposed identification along with control schematics and device specifications for PROFESSIONAL'S approval. Submit Drawings, schematics, operating instructions, etc. to be posted, framed, laminated, etc. to PROFESSIONAL for approval.

### 3.2 FIRE ALARM/SMOKE DETECTION COORDINATION

- A. When an existing fire alarm system exists, or a new fire alarm system is being installed as a part of this project (see *DIVISION 26 and 28*), the CONTRACTOR shall provide and install all specified duct and/or plenum mounted smoke detectors as called for by code, specified, and on Mechanical Drawings, etc. and connect devices to fire alarm system.
- B. In general, all smoke detectors shall annunciate to, and be compatible with the fire alarm system. All fire alarm wiring, annunciators, and adaptation to fire alarm system by the CONTRACTOR. All shutdown and controls to automatically de-energize HVAC systems are by the CONTRACTOR.
- C. It is the CONTRACTOR's responsibility to coordinate these responsibilities for safety and operating controls, for complete and operative HVAC systems.
- D. Smoke detectors of proper size and type shall be furnished and properly installed per NFPA and International Electrical and Mechanical codes. The detectors shall be furnished with necessary N.C. and N.O. contacts to accomplish shutdown of HVAC systems.
- E. Each detector shall have a remote alarm and test station installed where directed by ARCHITECT or as shown on Drawings.
- F. See *Division 26 and 28* specifications for other requirements; coordination by this CONTRACTOR.
- G. In general, specified CONTRACTOR above shall furnish and install approved smoke detection and shutdown controls for the following HVAC equipment and accessories:
  - 1. HVAC air handling systems with air delivery capacity 2000 cfm or greater.
  - 2. This includes makeup air, exhaust, heat recovery, ventilation and similar HVAC support and auxiliary systems.
  - 3. All HVAC equipment with smoke detectors shall be additionally connected to the fire alarm system such that the equipment shall automatically be de-energized by any fire alarm annunciation from the same zone as is served by the same HVAC equipment.

END OF SECTION



## SECTION 230990 - TESTING, ADJUSTING AND BALANCING

## PART 1 – GENERAL

## 1.1 SCOPE

- A. The process of Testing, Adjusting and Balancing (TAB) for mechanical HVAC and Plumbing systems is a requirement for this project.
- B. Definitions and Abbreviations:
  - 1. TAB: Testing, Adjusting and Balancing. The process of checking and adjusting HVAC and plumbing systems to meet design objectives and performance intent.
  - 2. AABC: Associated Air Balance Council.
  - 3. NEBB: National Environmental Balancing Bureau.
  - 4. Plumbing Systems: Domestic hot water and re-circulating systems.
  - 5. Air Systems: Included all supply air, return air, exhaust air, transfer air and outside air systems.
- C. The CONTRACTOR shall provide the services of a qualified independent TAB Agency for testing, adjusting, and balancing as described herein and include same in his bid. CONTRACTOR shall submit TAB AGENCY experience, agenda and associated credentials to PROFESSIONAL for TAB AGENCY and agenda approval.

## 1.2 APPLICABLE STANDARDS

- A. TAB Agency Qualifications: Current membership in AABC or NEBB.
- B. Performance Criteria: Work shall be performed in accordance with the approved TAB agenda requirements.
- C. Test Equipment Criteria: The basic instrumentation requirements and accuracy/calibration required by AABC (Section Two) or Section II of the NEBB Procedural Standards for Testing, Adjusting and Balancing of Environmental Systems.
- D. A factory air test hood, recently calibrated, shall be utilized for ceiling air device CFM measurement.

## 1.3 APPLICABLE PUBLICATIONS:

The following publications form a part of this Specification to the extent indicated by the reference thereto. In text the publications are referred to by the initials of the organization.

- A. Associated Air Balance Council (AABC):
  - 1. National Standards for Total System Balance, 2002 Edition
- B. National Environmental Balancing Bureau (NEBB):
  - 1. Procedural Standards for Testing, Adjusting, Balancing of Environmental Systems, 8th Edition, 2015
  - 2. Procedural Standards for Measuring Sound and Vibration, 2nd Edition, September 2006

#### 1.4 CORRESPONDENCE

- A. Representative of TESTING, ADJUSTING and BALANCING Agency shall report to the CONTRACTOR, during all phases of the test and balance process, any deficiencies that will impair the proper balance and operation of the systems involved. This shall include, but not limited to, reporting balancing valves/dampers, controls, and safety sensors, etc. not installed as called for on the Plans or in the Specifications.
- B. The TAB Agency shall submit preliminary reports a minimum seven (7) days prior to scheduled substantial completion for this project or any phase thereof, and including a comprehensive narrative of problems, obstacles, recommendations, and remedial actions for PROFESSIONAL'S review and approval.
- C. TAB Agency shall not release any reports to other parties until such has been approved by the PROFESSIONAL.

#### PART 2 PRODUCTS NOT APPLICABLE

#### PART 3 – EXECUTION

##### 3.1 GENERAL

- A. Coordinate TAB procedures with any phased construction requirements for the project so that usable increments of finished work may be accepted for beneficial occupancy. Systems serving partially occupied phases of the project may require balancing for each phase prior to final balancing and shall required separate TAB effort and reports for each phase and submittal prior to advancing to next phase of project.
- B. Allow sufficient time in construction schedule for TAB prior to substantial completion inspection for the project.
- C. Conduct final TAB after system has been completed and is in full working order. Put all HVAC systems into full operation and continue operation of the systems during each working day of TAB. Accomplish TAB in accordance with the CONTRACTOR provided Agenda approved by PROFESSIONAL.
- D. Substantial Completion: Substantial Completion of mechanical systems shall not be given without TAB Agency's written certification that the mechanical systems and controls have been thoroughly tested and are safely performing as intended. See certification required herein. No other certification will be acceptable.
- E. Preparation of Equipment and Systems for Testing and Balancing:
  - 1. The CONTRACTOR shall, upon completion of items or work required by this contract, thoroughly clean all dirt and debris from equipment, ducts, piping systems, strainers, accessories, etc. All bearings, gear boxes, wearing surfaces, or other equipment components requiring lubrication shall be properly serviced as recommended by the equipment manufacturer and shall be tagged with the date of service and type of lubricant used. All specified cleaning and protective devices shall then be installed in equipment, piping, plenums, ductwork, etc., and systems shall be placed in continuous operation. All fans shall have been in operation for at least twenty-four (24) hours prior to the start of testing and balancing so that initial stretch of drive belts will have taken place, and all other mechanical equipment including all temperature and operating control devices will have



been adjusted and calibrated for complete and functional operating service.

- F. System balancing and performance testing:
  - 1. The CONTRACTOR shall secure copies of all report forms, data sheets, and instrumentation to be used by the agency in the performance of their services and submit the same for approval. This submittal data shall include a tabulation of instruments and devices to be utilized in the performance of testing and balancing operations and shall include the name of the manufacturer of the instrument of devices, model number, range, degree of accuracy, date of last calibration, or the other pertinent information that may be required to determine the utility of the instrument of device. As a minimum requirement, the following instrumentation shall be employed in the performance of balancing and testing of mechanical system: swinging vane or hot wire type anemometer, low range (0-0.25 in. water column) inclined tube manometer, high range (0-20 in. water column) U-tube manometer, pilot tube, ammeter, volt-meter, self-timing tachometer (maximum scale Division 2 rpm) pyrometer, powered psychrometer, vibration meter, other instruments, tools, and devices as required to accurately balance and test mechanical systems and components.
- G. It is the responsibility of this section to make certain that all the submitted and/or existing equipment has proper motor size, sheave size, belt size, etc.

### 3.2 AIR BALANCE

- A. Place all interactive systems in operation with all filters installed and automatic control systems completed and operating. Artificially load air filters by partial blanking or other means to provide air pressure drop midway between the clean and dirty condition. Set/reset room thermostats and humidistat, and/or equipment controls as necessary to check heating and cooling functions, and air flow rates for air distribution devices and adjust units if not within specified tolerances.
- B. Balance systems to design ratings. Adjust fan speeds to provide design flows, including system diversities, at actual system pressures. Belt drives, including sheaves, belts, etc. shall be adjusted and/or replaced as required to safely obtain specified performance.
- C. Make pitot tube traverses of all trunk lines and major branches when required to determine proper proportioning of air flows. Airflow measuring devices, where installed, may be utilized for this purpose. Seal duct access holes with snap in plugs.
- D. Record pressure drop readings across all major system components and significant drops within duct systems such as air filters, coils, heaters, etc.
- E. Make flow and pressure measurements at each terminal device, and each supply, return, or exhaust diffuser. Adjust each air outlet unit within plus or minus 10 percent of design requirements, but total air for each system shall be not less than shown unless otherwise approved by PROFESSIONAL. Adjust grilles and diffusers to minimize drafts in all areas. Mark permanently all damper quadrants at final set points. Total differentials between ventilation and exhaust for the purpose of proper pressurization, shall be maintained.
- F. Adjust exhaust systems to indicated CFM requirements (+/- 10%).
- G. Test and balance supply and exhaust to Kitchen Hood Systems, maintaining the net

differential between them as required by the hood manufacturer. Balance and set dampers to equally distribute exhaust and supply along the hood length, per manufacturer's recommendations.

### 3.3 VIBRATION TESTING

Check for excessive vibration of rotating equipment.

### 3.4 SOUND TESTING

Check for excessive noise from equipment, air distribution devices, etc. and notify PROFESSIONAL of any objectionable noise levels. Perform noise/sound measurement and provide noise level calculations/results in rooms and areas requested by PROFESSIONAL.

### 3.5 DUCT LEAKAGE TESTS

See Section *Ductwork* for duct testing requirements.

### 3.6 BUILDING/ZONE PRESSURIZATION:

The Tab Agency shall test the building pressurization and report same to PROFESSIONAL. These tests shall include various simulations between maximum and minimum ventilation capacities, to assure proper relief capability and pressurization per current ASHRAE recommendations.

### 3.7 MINIMUM TAB DATA REQUIRED

Approved TAB Agency shall furnish all labor and materials to balance the following new and/or modified equipment and systems: The following minimum information shall be provided:

A. Roof Top Units: on systems scheduled to have multiple stages of heating and/or cooling capacity, or CFM requirements, provide the information for temperatures and/or airflow to indicate same for each operating condition. All information/data shall be gathered within a 90 minute period.

1. Total S/A CFM –
2. R/A CFM –
3. O/A CFM (Min/Max) –
4. R/A E.A.T. - Db/Wb (Cooling) –
5. O/A E.A.T. - Db/Wb (Cooling) –
6. S/A L.A.T. - Db/Wb - (first stage cooling only)
7. S/A L.A.T. - Db/Wb - (first & second stages cooling together)
8. R/A E.A.T. - (Heating) –
9. O/A E.A.T. (Heating) –
10. S/A L.A.T. - (first stage heating only) –
11. S/A L.A.T. - (first and second stages heating together) –
12. External Static Pressure
13. Fan RPM
14. Fan Motor F.L.A. rated vs. actual

15. Fan Motor Horsepower and Service Factor (belt drive units)
  16. Size, Type, Efficiency and Relative Condition of all Air Filters
- B. Fans:
1. CFM –
  2. Voltage –
  3. F.L.A. –
  4. External Static Pressure –
- C. Pump (Domestic Hot Water):
1. GPM
  2. F.L.A.
- D. Electric Wall Heaters:
1. kW –
  2. Voltage/Phase –
  3. Ambient air temperature (°F) –
  4. Heated air discharge temperature (°F) –
  5. Fan CFM –
- E. TAB Agency shall test and report the domestic hot water temperature at all Kitchen Area equipment and fixtures, which have hot water or “tepid” capability. Test all re-circulating potable hot water systems near the end of pump runs to ensure proper temperature. CONTRACTOR shall make any adjustments required of domestic water heaters, mixing valves, etc., in order to achieve scheduled domestic hot water temperature shown on Kitchen and Plumbing Fixture Rough-in Schedule on Contract Drawings (+/- 5° F). The flow from re-circulating pumps through mixing/tempering valves shall be balanced to provide the minimum flow as specified by the mixing valve manufacturer for safe operation in all load conditions.
- F. Balance all S.A., E.A. and O.A. air distribution devices to within 10% of specified C.F.M., yet main area pressurization and differentials.
- G. Mark all flow C.F.M., balance valve set points, etc. on an 11”x17” reduced scale set of working drawings and submit to PROFESSIONAL with TAB report prior to completion of work.
- H. Submit list of equipment with excessive vibration.
- I. Submit the Test and Balance report as indicated above, along with the working drawing to PROFESSIONAL for approval prior to completion and substantial completion inspection to job.
- J. Balance air distribution around perimeter of kitchen hood to avoid drafts. Balance fans to within +/- 10% of specified CFM and within 5% of differential between specified exhaust and supply make-up. Provide a narrative substantiating same with TAB report. Equalize supply and exhaust along length of hood(s).
- K. Verify that all mechanical system controls, safety and shutdown interlock and sequence of operation is as specified. TAB Agency shall provide written certification

that he has verified same and/or note any and all discrepancies. See paragraph 3.11 for specific certification.

### 3.8 TAB SITE VISIT COORDINATION

- A. The TAB Agency shall inform the PROFESSIONAL, in writing seven (7) calendar days prior to his site visit for final TAB of systems such that PROFESSIONAL may be present to witness same, at PROFESSIONAL'S sole discretion. Changes to schedule shall be coordinated with and approved by PROFESSIONAL, with sufficient advance notice. TAB Agency shall be required to coordinate with PROFESSIONAL'S office representative, date of final inspection, and provide random tests and verification of TAB report information, at PROFESSIONAL'S selection.
- B. It shall also be the responsibility of the TAB agency to include the cost of any opposite season check-out of all system components which might be required and modify air distribution delivery and/or temperature to any room, area, or zone which may require adjustment during the first year of system operation.

### 3.9 SYSTEM CHANGES

- A. Final balancing changes shall be approved by the CONTRACTOR'S who installed the equipment. Changes may encompass, but not be restricted to, changing the pulleys, belts, dampers or adding dampers, balancing valves, etc.
- B. The TAB Agency shall coordinate with the CONTRACTOR any changes required including belts, sheaves, etc. to balance systems within specified tolerances. All cost of any modifications is the responsibility of the CONTRACTOR.

### 3.10 VERIFICATION / INSPECTION

- A. After the final TAB report is submitted and reviewed by the PROFESSIONAL, he will soon afterward schedule a verification inspection with the TAB Agency. At this inspection, the TAB Agency will test airflow flows, water flows, sound levels, control operation and sequence, for random air distribution grilles, fans, AHU's, equipment, piping, etc., as selected by PROFESSIONAL.
- B. This inspection will last no longer than four (4) hours for each completed phase of the project. Should this verification information exceed the specified tolerance, the TAB Agency may be required to retest and balance the entire system(s) to these tolerances, solely at the PROFESSIONAL's discretion. A follow-up verification inspection shall then be required, and the procedure will begin again. The cost of these inspections, re-inspections, TAB and reports shall be borne by the CONTRACTOR.

### 3.11 CERTIFICATION

The TAB Agency shall provide the following written TAB certification within the final TAB report (see also Section *Mechanical Submittals and Shop Drawings*):

“The Testing, Adjusting and Balancing (TAB) Agency certifies that the HVAC air and plumbing water systems and controls have had a full range of tests and checks carried out by the TAB Agency, to determine if all components, sub-systems, systems and interfaces between systems operate in accordance with the Contract Documents. This includes all modes and sequences of control operation, interlocks and conditional and specified control responses to abnormal, safety and emergency conditions. The (TAB) Agency had provided to the OWNER the specified training

and documentation on the operation of these systems such that these systems can be safely and efficiently operated in line with design requirements.”

3.12 OWNER EDUCATION REQUIREMENTS AND INVOLVEMENT

See Section *Mechanical Close-out Requirements* for Owner Education requirements.

END OF SECTION



**SECTION 260010  
BASIC ELECTRICAL REQUIREMENTS**

**PART 1 GENERAL****1.01 DESCRIPTION**

- A. This section is an extension of the General Requirements and certain items of a common or administrative nature that pertain to all electrical work.
- B. The work of this section consists of furnishing materials, equipment, constant competent supervision, special tools, test equipment, technicians, and labor necessary for installation of a complete working electrical system as indicated herein and on the Drawings.
- C. The work shall include but not necessarily be limited to the following:
  - 1. Temporary electrical service for construction.
  - 2. All Electrical Construction.
- D. Lighting System.
- E. Power System.
- F. Fire Alarm System
- G. Telecommunication System.
- H. Security Cameras (Conduit and Ethernet Cable only)
- I. Grounding system.

**1.02 QUALITY ASSURANCE**

- A. The electrical installation shall conform to the requirements of the latest edition of the National Electrical Code (NEC). Notify Architect/Engineer of conflicts before performance.
- B. Electrical material shall be built and tested in accordance with the applicable standards of the (NEMA), (ANSI), (ASTM), and (IEEE).
- C. Electrical materials shall be new and unused and shall be listed and labeled for the service intended by Underwriters' Laboratories, Inc., where such labeling service is available.

**1.03 REGULATORY REQUIREMENTS**

- A. Permits: Obtain and pay for all necessary permits, inspections, connection charges, fees, insurance, bond, licenses, and comply with all governing laws, ordinances, rules and regulations.
- B. Certificates of Inspection: Upon completion and before the date of substantial completion of each designated Phase, furnish a certificate of inspection issued by Ingalls to the effect that the installation is in full conformity with all Ingalls requirements.

**1.04 COORDINATION**

- A. Contractor shall be responsible for coordination of all work with other disciplines.
- B. Arrange work in a neat, well organized manner with exposed conduit and similar services running parallel with primary lines of the building construction, high as possible with a minimum of 8'-0" overhead clearance or as directed by the Engineer.
- C. Where the method of installation is not certain, ask for details. Lack of details, not requested, will not be an excuse for improper installation, and any such work must be corrected at contractor's cost.
- D. Coordination Drawings: For locations where several elements of electrical or combined mechanical and electrical work must be sequenced and positioned with precision in order to fit into the available space, prepare coordination drawings showing the actual physical dimensions (at accurate scale, minimum 1/4") required for the installation. Prepare and submit coordination drawings prior to purchase-fabrication-installation of any of the elements involved in the coordination.

- E. All Bidders shall be responsible to insure that equipment selected, switchboards, panel boards, etc., fit in spaces selected, along with NEC compliance. If standard equipment does not fit, Contractor shall be required to utilize custom equipment as required.

### **1.05 DRAWINGS AND SPECIFICATIONS**

- A. Contract Documents (Drawings and Specifications) are intended to convey the scope of work and indicate general arrangements of equipment, fixtures and piping, and approximate sizes and locations of equipment and outlets. Follow these documents in laying out the work, check all Drawings to become familiar with all conditions affecting the work, and verify spaces in which the work will be installed.
- B. The contractor shall fully coordinate installation of electrical system with other disciplines. The Drawings show approximate locations only of selected feeders, branch circuits, outlets, etc., except where specific routing or dimensions are indicated. The Engineer reserves the right to make reasonable changes in locations indicated before roughing-in without additional cost to the Owner.
  - 1. Contractor shall investigate the structural and finish conditions affecting Division 26 work and shall arrange such work accordingly, furnishing fittings, bends, junction boxes, pull boxes, access panels, and accessories required to meet such conditions.
  - 2. These Specifications, together with the accompanying Drawings, contemplate apparatus fully erected, and in satisfactory operating condition with the Contractor furnishing and installing everything that may be necessary to complete the job.
  - 3. Contractor shall install circuits, breakers, equipment, etc. as indicated and label the above as noted. Contractor shall not deviate from equipment/circuit identification unless approved by Owner/Engineer.

### **1.06 SUBMITTALS**

- A. Shop Drawings:
  - 1. Listed below are shop drawings required for transmittal. Refer to Phasing Plan for scheduling of submittal. No time delays will be allowed for failure to be so informed.
    - a. Lighting Fixtures (Interior and Exterior under the same submittal)
    - b. Lighting Controls (Submit under the Lighting Submittal)
    - c. Lamps
    - d. Raceways
    - e. Connectors
    - f. Safety Switches
    - g. Fuses
    - h. Circuit Breakers
    - i. Wiring Devices
    - j. Motor Controls
    - k. Panel boards
    - l. Conductors
    - m. Fire Alarm System Components
    - n. Telecommunicaton System Components
    - o. Relays and Contactors
  - 2. Grounding products
  - 3. Further descriptions or information required with shop drawings shall be included with the description of materials specified herein as follows:
    - a. Grounding Products: Include a complete grounding system diagram with materials and ground conductor sizes.
    - b. Miscellaneous Electrical Controls and Control Wiring: Include control wiring diagrams for all miscellaneous electrical controls.
    - c. Housekeeping Pads: Include location and dimensions of housekeeping pads, including blockouts and anchor bolts.
  - 4. Firestops: Include all firestop materials for the project, indicating intended use and UL fire rating where applicable.



- a. Provide "SpecSeal" products or equal. Provide SSB series firestop pillows (or equal) around the cable tray where cable trays make penetration in the walls, etc. Provide "LC150" series sealant (or equal) to seal the penetrations made by conduits.
5. Contractor prepared, new, detailed, dimensioned shop Drawings for the installation of the work in the electrical equipment rooms areas shall be prepared and submitted for review. In preparing shop Drawings, establish lines and levels for the work specified and check the drawings to avoid interference with structural features and the work of other trades. Immediately call to the attention of the Engineering in writing any interferences for clarification.
6. Corrections or comments made on shop Drawings during the review do not relieve the Contractor from compliance with requirements of the contract documents. Review of shop Drawings shall not permit any deviation from Drawings and Specifications. Shop Drawings must be accompanied by signed statement from contractor, stating that he has reviewed the submittal and checked it for compliance. Contractor shall make note on the submittals if they deviate from the contract documents.
7. Contractor shall provide products as specified if submittals for review of materials are not received within thirty (30) days after award of the Contract.

#### **1.07 PROJECT/SITE CONDITIONS**

- A. Visit the site before bidding to become familiar with conditions under which the work will be performed.
- B. No additional compensation will be allowed for failure to be so informed.

#### **1.08 CUTTING AND PATCHING**

- A. Do all cutting, patching, fitting, and all other work that may be required to make the several parts come together and fit.
- B. Provide, everything required for the work or to conceal any of the work, in any part of the structure.
- C. Fireproofing:
  1. Plastic sleeves/pipe shall not be used within the building when penetrating a fire-resistant-rated wall, ceiling, partition, or floor.

#### **1.09 RECORD DRAWINGS**

- A. Upon completion of the project, provide a complete set of detailed electronic as-built drawings in AutoCAD 2005 format with all information required. Contractor shall also produce (2) sets of as-built drawings with modifications to construction documents in red ink. Contractor shall maintain a current set of as-built drawings on site at all times. As-built drawings shall include, but not be limited to detailed dimensions of all conduits, ductbank, etc. install in slab or below grade.
- B. Equipment Manuals:
  1. Before the date of substantial completion, Contractor shall furnish to the Engineer three (3) bound sets of descriptive, dimensional and parts data on all major items of electrical equipment and material including those items listed above under "Shop Drawings:".

#### **1.10 WARRANTY/GUARANTEE**

- A. Except where longer periods of warranty are specified, guarantee all labor and materials for a period of twelve (12) months from the date of substantial completion of the particular phase of the work. Repair all defective materials and work; replace with new materials and/or equipment, any material and/or equipment failing to give satisfactory service.
- B. During the period of guarantee, promptly correct any defects in equipment, materials or workmanship without cost to the Owner.
- C. Guarantee includes equipment capacity and performance ratings specified without excessive noise levels. Any deficiencies in equipment specified shall be promptly corrected.
- D. Contractor's warranty shall include an inspection of the system one (1) week before the end of the one (1) year warranty period. Replace or repair any items found to be defective at this time.

**1.11 TESTS AND BALANCING**

- A. At such times as the Engineer directs, conduct operating tests to demonstrate that the electrical systems are installed and will operate properly and in accordance with the requirements of this Specification. Tests shall be performed in the presence of the Engineer's representative. Furnish instruments and personnel required for such tests.
- B. Any work and materials tested and found varying from the requirements of the Drawings and Specifications shall be replaced without additional cost to the Owner.
- C. This section does not relieve the Contractor from testing equipment installed under this Division but not listed in this section. Contractor is required to test all equipment, feeders, etc., installed under this Division.

**PART 2 PRODUCTS****2.01 GENERAL**

- A. Refer to DIVISION 1 sections for general requirements on products, materials and equipment. Refer to other DIVISION 26 sections for additional requirements.
- B. Provide products which are compatible with other products of the electrical work, and with other work requiring interface with the electrical work, including electrical connections and control devices. Determine in advance of purchase that equipment and materials proposed for installation will fit into the confines indicated, leaving adequate clearance as required by applicable codes, and for adjustment, repair, or replacement.

**2.02 MANUFACTURERS' NAMEPLATES**

- A. Each major component of the equipment shall have the manufacturer's name, address, model number, and rating on a plate securely affixed in a conspicuous place.

**PART 3 EXECUTION****3.01 GENERAL**

- A. Visit the building site before bidding to determine existing conditions and assume all responsibility and bear all expenses in allowing for these conditions in the bid.
- B. Obtain all necessary permits, pay all legal fees and charges.
- C. No work shall be concealed until approved by the engineer and all regulations are adhered to. Provide certificate of completion.
- D. Cooperate with other trades in installing work in order that there will be no conflict of space required by conduit, piping, ducts, outlets, etc.
- E. Verify dimensions with certified shop Drawings of the materials actually approved and purchased.

**3.02 TEMPORARY WIRING, LIGHTING AND POWER AT THE SITE**

- A. Furnish and install provisions for temporary electrical service and construction light and power during the construction period.
- B. Furnish, install, and maintain all temporary service equipment as required until permanent service is installed, switch-over temporary systems to the permanent service when latter is ready for same.
- C. Furnish, install, maintain, and switch on and off on all regular work days a complete temporary light system, for the building while under construction.
- D. Provide any and/or all relocations of temporary electric facilities as necessary to avoid the permanent installations of all trades.

**3.03 WIRING FOR EQUIPMENT BY OTHERS**

- A. Electrical service for all equipment furnished under this Specification and/or indicated on the Drawings shall be roughed-in and connected under this Section.
- B. Electrical work for equipment specified in Division 25 - Mechanical shall be as specified.

- C. Electrical work for Performing Arts Theatrical and AV - Electrical Contractor shall refer to the Theatrical and AV drawings for wiring requirements.
- D. Raceways, outlets, backboards, cabinets, grounding connections, handholes, underground distribution system, and other roughing-in indicated shall be provided as work of this division for intercom system, telecommunication system, fire alarm system and HVAC Control 120V power (Contractor to provide cable as well).

#### **3.04 WORKMANSHIP**

- A. Install all materials and electrical components of the work in accordance with instructions of manufacturer following the best modern construction practices and conforming with the Contract Documents. Workmanship shall be first class, in both function and appearance, whether finally concealed or exposed and shall be performed by experienced workmen skilled in the type of work. As practicable, the lines of all components of the system shall be perpendicular or parallel. In general, workmanship shall conform to guidelines set forth in N.E.C.A. manuals.

#### **3.05 MOUNTING HEIGHTS**

- A. Upon approval of the Engineer mounting heights may be adjusted.

**END OF SECTION**



**SECTION 260051  
ELECTRICAL RELATED WORK**

**PART 1 GENERAL****1.01 DESCRIPTION**

- A. Extent of electrical related work required by this section is indicated on Drawings and/or specified in other Division 26 sections.

**1.02 PROJECT/SITE CONDITIONS**

- A. Protect property from damage which might result from excavating and backfilling.
- B. Protect persons from injury at excavations by barricades, warnings and illumination.
- C. Coordinate excavations with weather conditions, to minimize possibility of washouts, settlements and other damages and hazards.

**PART 2 PRODUCTS****2.01 ACCESS TO ELECTRICAL WORK**

- A. Provide removable access doors of types and sizes needed for access requirements of Electrical Equipment.

**PART 3 EXECUTION****3.01 EXCAVATION, TRENCHING AND BACKFILLING**

- A. Perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings or as otherwise specified or as required based on field condition. All excavated materials not required or not suitable for backfill shall be removed.
- B. Sheeting and shoring shall be done as necessary for the protection of the work and for the safety of personnel.
- C. No excavation or trenches shall be cut near or under footings without first consulting the Engineer.
- D. Provide uniform circumferential support to lower third of each conduit or pipe. Each conduit or pipe shall be laid true to line and grade to prevent sudden offset to flow line. As work progresses, interior of conduit or pipe shall be cleared of dirt and superfluous materials of every description.
- E. Provide proper supporting material as required based on field condition.
  - 1. Trenches for utilities shall be of a depth that will provide the following minimum depth of cover from existing grade or from indicated finish grade, whichever is lower, unless otherwise specifically shown:
    - a. 30-Inch Minimum Cover - Electrical Conduits/Cables over 600 volts
    - b. 24-inch Minimum (See NEC 300-5) - Electrical Cables/Conduits under 600 volts.
  - 2. Backfill shall be installed in layers 6" deep, adequately wetted and tamped using materials as noted above. Refer to Division 2 for compaction densities.
  - 3. Restore all hard finished surfaces such as roadways, sidewalks, grass, shrubbery, etc., removed for installation of utilities (and not shown on Drawings or specified to be reworked under other sections of the work) to their original condition. Restore to near original condition acceptable to Architect/Engineer.
  - 4. Carefully plan all work to avoid existing utilities and other interferences. The Drawings do not indicate all existing underground utilities. Existing utility lines to be retained that are shown on the Drawings or the locations of which are made known to the Contractor prior to excavation, as well as all utility lines uncovered during excavation operations, shall be protected from damage during excavation and backfilling and, if damaged, shall be repaired by Contractor at his expense. Prior to doing any excavation with power tools, carefully investigate and locate any exiting conduit, pipes, and other lines.

**3.02 FOUNDATIONS AND SUPPORTS**

- A. Provide concrete pedestals, bases, pads, curbs, anchor blocks, anchor bolts, slab inserts, hangers channels, cradles, saddles, etc. for installation of floor mounted equipment.
- B. Concrete pads for floor mounted electrical equipment shall be 3.5 inches high, unless otherwise indicated, poured integral with the floor slab wherever practical. Wherever integral slab poured pads are not practicable, construct 3.5 inch high housekeeping pads, reinforced with No. 3 steel wire mesh 6 X 6 inches, fastened to structural slabs with 1/2 inch diameter bolts embedded in structural slabs with expansion bolts at all corners (inset 3 inches) and no further apart than 18 inches. Score structural slab thoroughly to assure concrete bonding between structural slab and housekeeping pad. Construct in full accordance with "concrete" specifications for 2500 psi minimum compressive strength. Finish tops of housekeeping pads smooth and level within 1 percent of span. Pads shall be extended at least 4" (10 cm) beyond the equipment outline on all four sides with chamfered edges.

**3.03 PAINTING**

- A. Factory painted equipment shall have finish restored to Manufacturer's finish if scratched or damaged before acceptance or use by Owner.

**END OF SECTION**

**SECTION 260170  
CIRCUIT AND MOTOR DISCONNECTS**

**PART 1 GENERAL****1.01 DESCRIPTION OF WORK**

- A. The work of this section consists of providing labor, materials, tools, appliances and miscellaneous accessories associated with the circuit and motor disconnect switch work indicated herein and on Drawings and schedules.
- B. Types of circuit and motor disconnect switches in this section include the following:
  - 1. Equipment disconnects.
  - 2. Appliance disconnects.

**PART 2 PRODUCTS****2.01 ACCEPTABLE MANUFACTURER**

- A. Square D.

**2.02 FABRICATED SWITCHES**

- A. Provide Heavy Duty safety switches and the best possible quality which yields the most protection for equipment and personnel for the intended use. If there is conflict between the drawings and the specifications, the contractor shall use the one that yields the most stringent protection requirements.
  - 1. Fused switches shall include the following:
  - 2. All fusible switches shall accept Class R fuses and have provision for field installation of U.L. listed rejection feature.
  - 3. The U.L. listed short circuit rating shall be 100,000 symmetrical amperes when Class R fuses and fuse kits are installed.
- B. Type of Enclosure for the Different Locations:
  - 1. Recess panel board.
  - 2. NEMA Type 1: Indoor use.
  - 3. NEMA Type 12/3R: Outdoor use.
- C. All switches shall /be listed per U.L. Standard 98; comply with Federal Specifications W-S-865; comply with NEMA KS-1.

**PART 3 EXECUTION****3.01 INSTALLATION OF CIRCUIT DISCONNECT SWITCHES**

- A. Install disconnect switches where indicated, complying with manufacturer's written instructions, applicable requirements of NEC, NEMA, and NECA's "Standard of Installation", and in accordance with recognized industry practices to ensure that products fulfill requirements.
- B. Provide and install fuses where applicable and/or shown on the Drawings.
- C. Install label nameplate as required.

**END OF SECTION**





**SECTION 260505  
SELECTIVE DEMOLITION FOR ELECTRICAL**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Electrical demolition.

**1.02 RELATED REQUIREMENTS**

- A. Section 017000 - Execution and Closeout Requirements: Additional requirements for alterations work.

**PART 2 PRODUCTS****2.01 MATERIALS AND EQUIPMENT**

- A. Materials and equipment for patching and extending work: As specified in individual sections.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify field measurements and circuiting arrangements are as indicated.
- B. Verify that abandoned wiring and equipment serve only abandoned facilities.
- C. Demolition drawings are based on casual field observation and existing record documents.
- D. Report discrepancies to Engineer/Architect before disturbing existing installation.
- E. Beginning of demolition means installer accepts existing conditions.

**3.02 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

**3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove abandoned luminaires. Remove brackets, stems, hangers, and other accessories.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

**END OF SECTION**

**SECTION 260519**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Service entrance cable.
- C. Metal-clad cable.
- D. Wiring connectors.
- E. Electrical tape.
- F. Heat shrink tubing.
- G. Oxide inhibiting compound.
- H. Wire pulling lubricant.
- I. Cable ties.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conductors.

**1.03 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010 (Reapproved 2014).
- D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2014).
- E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2010.
- F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2013.
- G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- H. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC) 2012.
- I. NEMA WC 70 - Nonshielded Power Cable 2000 V or Less for the Distribution of Electrical Energy 2009.
- J. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2013.
- K. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- L. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
- M. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
- N. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.

- O. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
- P. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
- Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
- R. UL 854 - Service-Entrance Cables Current Edition, Including All Revisions.
- S. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F (-10 degrees C), unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Engineer/Architect and obtain direction before proceeding with work.

### **PART 2 PRODUCTS**

#### **2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      - 1) Maximum Length: 6 feet (1.8 m).

## 2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Provide new conductors and cables manufactured not more than one year prior to installation.
- D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- E. Comply with NEMA WC 70.
- F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- H. Conductors for Grounding and Bonding: Also comply with Section 260526.
- I. Conductors and Cables Installed Exposed in Spaces Used for Environmental Air (only where specifically permitted): Plenum rated, listed and labeled as suitable for use in return air plenums.
- J. Conductor Material:
  - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
  - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
  - 3. Tinned Copper Conductors: Comply with ASTM B33.
- K. Minimum Conductor Size:
  - 1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
- L. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- M. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
    - a. Conductors size 4 AWG and larger may have black insulation color coded using vinyl color coding electrical tape.
  - 3. Color Code:
    - a. 240/120 V High-Leg Delta, 3 Phase, 4 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B (High-Leg): Orange.
      - 3) Phase C: Blue.
      - 4) Neutral/Grounded: White.
    - b. 240/120 V, 1 Phase, 3 Wire System:

- 1) Phase A: Black.
- 2) Phase B: Red.
- 3) Neutral/Grounded: White.
- c. Equipment Ground, All Systems: Green.
- d. Travelers for 3-Way and 4-Way Switching: Pink.

### 2.03 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
  1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. General Cable Technologies Corporation; \_\_\_\_\_: [www.generalcable.com/#sle](http://www.generalcable.com/#sle).
    - d. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
    - e. Or Approve Equal.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Stranded.
    - b. Size 8 AWG and Larger: Stranded.
  2. Control Circuits: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
    - a. Fixture Wiring Within Luminaires: Type TFFN/TFN for luminaires with labeled maximum temperature of 90 degrees C; Approved suitable type for luminaires with labeled maximum temperature greater than 90 degrees C.

### 2.04 SERVICE ENTRANCE CABLE

- A. Manufacturers:
  1. Copper Service Entrance Cable:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
- B. Service Entrance Cable for Underground Use: NFPA 70, Type USE single-conductor cable listed and labeled as complying with UL 854, Type USE-2 and with UL 44 Type RHH/RHW-2.
- C. Conductor Stranding: Stranded.
- D. Insulation Voltage Rating: 600 V.

### 2.05 METAL-CLAD CABLE

- A. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- B. Conductor Stranding:
  1. Size 10 AWG and Smaller: Solid.
  2. Size 8 AWG and Larger: Stranded.
- C. Insulation Voltage Rating: 600 V.
- D. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- E. Grounding: Full-size integral equipment grounding conductor.
- F. Armor: Steel, interlocked tape.

## 2.06 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use Barrel Crimp Sleeves or Barrel Crimp Sleeves.
  - 2. Copper Conductors Size 6 AWG and Larger: Use Barrel Crimp Sleeves or Barrel Crimp Sleeves.
- D. Wiring Connectors for Terminations:
  - 1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  - 2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
  - 3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
  - 4. Provide motor pigtail connectors for connecting motor leads in order to facilitate disconnection.
  - 5. Copper Conductors Size 8 AWG and Larger: Use compression connectors where connectors are required.
- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
- F. Do not use push-in wire connectors as a substitute for Barrel Crimp connectors.
- G. Mechanical or twist on Connectors: Provide bolted type or set-screw type.
  - 1. Manufacturers:
    - a. Burndy LLC; \_\_\_\_\_: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
- H. Compression Connectors: Provide circumferential type or hex type crimp configuration.
  - 1. Manufacturers:
    - a. Burndy LLC; \_\_\_\_\_: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.

## 2.07 ACCESSORIES

- A. Electrical Tape:
  - 1. Manufacturers:
    - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
    - b. Plymouth Rubber Europa: [www.plymouthrubber.com/#sle](http://www.plymouthrubber.com/#sle).
  - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
  - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil (0.76 mm); suitable for continuous temperature environment up to 194 degrees F (90 degrees C) and short-term 266 degrees F (130 degrees C) overload service.
  5. Electrical Filler Tape: Rubber-based insulating moldable putty, minimum thickness of 125 mil (3.2 mm); suitable for continuous temperature environment up to 176 degrees F (80 degrees C).
  6. Varnished Cambric Electrical Tape: Cotton cambric fabric tape, with or without adhesive, oil-primed and coated with high-grade insulating varnish; minimum thickness of 7 mil (0.18 mm); suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
  7. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil (2.3 mm).
- B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
  - C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
  - D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
  - E. Cable Ties: Material and tensile strength rating suitable for application.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70 and these specifications.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

#### **3.03 INSTALLATION**

- A. Circuiting Requirements:
  1. Unless dimensioned, circuit routing indicated is diagrammatic.
  2. When circuit destination is indicated without specific routing, determine exact routing required.
  3. Arrange circuiting to minimize splices.
  4. Include circuit lengths required to install connected devices within 10 ft (3.0 m) of location indicated.
  5. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
  6. Maintain separation of wiring for emergency systems in accordance with NFPA 70.
  7. Circuiting Adjustments: Unless otherwise indicated, when branch circuits are indicated as separate, combining them together in a single raceway is not permitted.
    - a. Provide no more than six current-carrying conductors in a single raceway. Dedicated neutral conductors are considered current-carrying conductors.
    - b. Increase size of conductors as required to account for ampacity derating.
    - c. Size raceways, boxes, etc. to accommodate conductors.

8. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.
- B. Install products in accordance with manufacturer's instructions.
- C. No conductor shall bear more than eight percent (80%) of its rated ampacity.
- D. The system shall be properly grounded and continuously polarized throughout following the color coding specified.
- E. Do not use mechanical means to pull wire No. 8 AWG. or smaller.
- F. Type AC or MC cable is not allowed except as allowed in this spec.
- G. Perform work in accordance with NECA 1 (general workmanship).
- H. Install metal-clad cable (Type MC) in accordance with NECA 120.
- I. Installation in Raceway:
  1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  2. Pull all conductors and cables together into raceway at same time.
  3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- J. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- K. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- L. Terminate cables using suitable fittings.
  1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- M. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.
- N. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet (1.5 m) of slack.
- O. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- P. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- Q. Make wiring connections using specified wiring connectors.
  1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  3. Do not remove conductor strands to facilitate insertion into connector.
  4. Clean contact surfaces on conductors and connectors to suitably remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
  5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.



6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- R. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
  1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
    - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
  2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
    - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.
  3. Wet Locations: Use heat shrink tubing.
- S. Insulate ends of spare conductors using vinyl insulating electrical tape.
- T. Field-Applied Color Coding: Where vinyl color coding electrical tape is used in lieu of integrally colored insulation as permitted in Part 2 under "Color Coding", apply half overlapping turns of tape at each termination and at each location conductors are accessible.
- U. Identify conductors and cables in accordance with Section 260553.
- V. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- W. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. prior to energization, test cable and wire for continuity of circuitry, and also for short circuits.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
  1. Disconnect surge protective devices (SPDs) prior to performing any high potential testing. Replace SPDs damaged by performing high potential testing with SPDs connected.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION**



**SECTION 260526**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground bars.
- E. Ground rod electrodes.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
  - 1. Includes oxide inhibiting compound.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

**1.03 REFERENCE STANDARDS**

- A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2007.
- D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2013.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- F. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify exact locations of underground metal water service pipe entrances to building.
  - 2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.
  - 3. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not install ground rod electrodes until final backfill and compaction is complete.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- B. Shop Drawings:
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Field quality control test reports.
- E. Project Record Documents: Record actual locations of grounding electrode system components and connections.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**1.08 DESCRIPTION OF WORK**

- A. The work of this section consist of providing labor, materials, tools, appliances and miscellaneous accessories associated with grounding of the electrical system as required by and as indicated herein and/or on the drawings.
- B. Main electrical service equipment, raceways, motors, panelboards and other electrical equipment shall be effectively and permanently grounded to the grounding electrode system. This electrode shall be the nearest available effectively grounded structural metal member of the structure or the nearest available effectively grounded metal water pipe and also a driven rod. Grounding connections and conductor sizes shall be in accordance with the requirements of the National Electrical Code, Article 250, local ordinances, and as described herein.
- C. A separate grounding conductor, sized in accordance with NEC Table 250-122 shall be provided in the conduit with the circuit conductors for all feeder and branch circuits. The grounding conductor may be bare or insulated copper; however, if this conductor is insulated, the insulating covering shall be green in color. Where bare copper grounding conductors are used, mark the conductor ends with green tape. Conduit runs shall be increased in size where necessary to accommodate the grounding conductor in addition to circuit conductors. The electrical continuity of all conduit runs shall be verified and corrected where necessary.
- D. Isolated Ground Connectors shall be insulated. Additional grounding conductors and conduit shall be provided as specified herein or shown on the drawings. All conduit for grounding system conductors, not run in conduit with circuit conductors, shall be rigid steel conduit.
- E. All electrical equipment enclosures and conductor enclosures shall be grounded. This includes but is not limited to metal raceways, outlet boxes, cabinets, switch boxes, work stations, motor frames, transformer cases and metallic enclosure for all electrical equipment.
- F. Under no circumstances shall neutral conductors again be grounded after they have been grounded once at the transformer secondary except at a separately derived system.
- G. Panelboards shall be equipped with a neutral bar which is insulated from the enclosure, and a grounding bar which is bonded to the enclosure. The grounding bar shall provide for terminating the green equipment grounding conductors in the panelboard or motor control center cabinets. Neutral busses shall be isolated from ground except at the main bonding jumper.
- H. Types of grounding in this section includes the following:
  - 1. Underground metal water piping.
  - 2. Grounding electrodes
  - 3. Service Equipment
  - 4. Enclosures
  - 5. Systems
  - 6. Equipment
  - 7. Fencing

- I. Requirements of this section apply to electrical grounding work specified elsewhere in these specifications.
- J. Provide bonding jumper across water meter. The bonding jumper shall be the same size as the grounding electrode conductor and long enough to allow the meter to be removed without disconnecting the bonding jumper.

## **PART 2 PRODUCTS**

### **2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Existing Work: Where existing grounding and bonding system components are indicated to be reused, they may be reused only where they are free from corrosion, integrity and continuity are verified, and where acceptable to the authority having jurisdiction.
- B. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- C. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- D. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- E. Grounding System Resistance:
  1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Engineer/Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- F. Grounding Electrode System:
  1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
  2. Metal Underground Water Pipe(s):
    - a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
    - b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    - c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
  3. Metal In-Ground Support Structure:
    - a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
  4. Concrete-Encased Electrode:
    - a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
  5. Ground Rod Electrode(s):
    - a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
    - c. Where location is not indicated, locate electrode(s) at least 5 feet (1.5 m) outside building perimeter foundation as near as possible to electrical service entrance; where possible, locate in softscape (uncovered) area.

6. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
  - a. Ground Bar Size: as shown on drawings unless otherwise indicated or required.
  - b. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.
- G. Separately Derived System Grounding:
  1. Separately derived systems include, but are not limited to:
    - a. Transformers (except autotransformers such as buck-boost transformers).
  2. Provide grounding electrode conductor to connect derived system grounded conductor to nearest effectively grounded metal building frame. Unless otherwise indicated, make connection at neutral (grounded) bus in source enclosure.
  3. Provide bonding jumper to connect derived system grounded conductor to nearest metal building frame and nearest metal water piping in the area served by the derived system, where not already used as a grounding electrode for the derived system. Make connection at same location as grounding electrode conductor connection.
  4. Where common grounding electrode conductor ground riser is used for tap connections to multiple separately derived systems, provide bonding jumper to connect the metal building frame and metal water piping in the area served by the derived system to the common grounding electrode conductor.
  5. Provide system bonding jumper to connect system grounded conductor to equipment ground bus. Make connection at same location as grounding electrode conductor connection. Do not make any other connections between neutral (grounded) conductors and ground on load side of separately derived system disconnect.
  6. Where the source and first disconnecting means are in separate enclosures, provide supply-side bonding jumper between source and first disconnecting means.
- H. Bonding and Equipment Grounding:
  1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
  7. Provide bonding for interior metal piping systems in accordance with NFPA 70. This includes, but is not limited to:
    - a. Metal water piping where not already effectively bonded to metal underground water pipe used as grounding electrode.
    - b. Metal gas piping.
  8. Provide bonding for interior metal air ducts.
  9. Provide bonding for metal building frame.
  10. Provide bonding for metal siding not effectively bonded through attachment to metal building frame.
- I. Telecommunications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
  - a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
  - b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
  - c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
  - d. Ground Bar Mounting Height: 18 inches (450 mm) above finished floor unless otherwise indicated.

## 2.02 GROUNDING AND BONDING COMPONENTS

- A. General Requirements:
  1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
  1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
- C. Connectors for Grounding and Bonding:
  1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
- D. Ground Bars:
  1. Description: Copper rectangular ground bars with mounting brackets and insulators.
  2. Size: As indicated.
  3. Holes for Connections: As indicated or as required for connections to be made.
- E. Ground Rod Electrodes:
  1. Comply with NEMA GR 1.
  2. Material: Copper-bonded (copper-clad) steel.
  3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
  4. Where rod lengths of greater than 10 feet (3.0 m) are indicated or otherwise required, sectionalized ground rods may be used.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Weld grounding conductors to underground grounding electrodes/grounding ring. The building equipment grounding system shall consist of the ground wire and electrically continuous metallic conduit system. Every item of equipment served by the electrical system shall be bonded to the building equipment ground. Metallic piping and duct systems which are

- electrically isolated shall be bonded to the equipment grounding system with a flexible bonding jumper.
- D. The neutral shall be grounded to the grounding electrode system at the service entrance only, and shall be kept isolated from the building grounding system throughout the building. The neutral of separately derived systems shall be grounded at one point as specified herein below.
  - E. Continuity of the building equipment grounding system shall be maintained throughout the project. Grounding jumpers shall be installed across conduit expansion fittings, all liquid-tight flexible metal and flexible metal conduit, light fixture pigtails in excess of 6' and all other non-electrically continuous raceway fittings.
  - F. All main grounding conductors shall be stranded copper conductors, sized as shown and/or required, and run in a suitable raceway. All main grounding conductors shall be continuous without joints or splices over their entire length.
  - G. Ground telecommunication service equipment as required by local utility.
  - H. Flexible conduit longer than 6' shall not be considered a ground path.
  - I. Ground all grounding-type receptacles with a separate ground wire.
  - J. Grounding of all motors or equipment connected to terminal box with flexible conduit shall be made with a separate grounding conductor between motor frame or equipment cabinet and rigid conduit system. Grounding conductor shall be sized in accordance with table 250-122 of the NEC.
  - K. All grounding conductors shall be amply protected from mechanical injury and shall be supported in an approved manner. Where conductors are located in concrete, they shall be installed in conduit. Where ground conductors enter or emerge from slabs bearing directly on fill or soil, the voids between the conductor and the surrounding conduit shall be filled with compound to provide an effective water seal.
  - L. Grounding conductors shall be not smaller than #12 AWG. Conductors shall be high conductivity copper, and sizes larger than #12 shall be stranded.
  - M. Insulated bushings shall be installed on all raceways at transformers, switchboards, motor control centers, dry-type transformers, as well as switches used as service equipment.
  - N. Install braided type bonding jumpers with clamps on water meter piping to electrically bypass the water meter.
  - O. Install clamp-on connectors only on thoroughly cleaned metal contact surfaces, to ensure electrical conductivity and circuit integrity.
  - P. Ground each steel structural column to the grounding electrode system. "Cadweld" grounding conductor to steel column.
  - Q. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70.
    - 1. Outdoor Installations: Unless otherwise indicated, install with top of rod 12 inches below finished grade.
  - R. Make grounding and bonding connections using specified connectors.
    - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
    - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
    - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
    - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.



5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- S. Identify grounding and bonding system components in accordance with Section 260553.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.
- F. Submit detailed reports indicating inspection and testing results and corrective actions taken.

**END OF SECTION**



**SECTION 260529  
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 RELATED REQUIREMENTS**

- A. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.
- C. Section 265100 - Interior Lighting: Additional support and attachment requirements for interior luminaires.
- D. Section 265600 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

**1.03 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2015.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 5B - Strut-Type Channel Raceways and Fittings Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- C. Evaluation Reports: For products specified as requiring evaluation and recognition by ICC Evaluation Service, LLC (ICC-ES), provide current ICC-ES evaluation reports upon request.

- D. Installer's Qualification Statement: Include evidence of compliance with specified requirements.
- E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- D. Installer Qualifications for Powder-Actuated Fasteners (when specified): Certified by fastener system manufacturer with current operator's license.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURED SUPPORTING DEVICES**

- A. General: Provide supporting devices complying with manufacturer's standard materials, design and construction in accordance with published product information, and as required for a complete installation and as herein specified. Where more than one type of device meets indicated requirements, selection is Installer's option.
- B. Support: Provide supporting devices of types, sizes and materials as required and having the following construction features:
  - 1. Clevis Hangers: For supporting 2" rigid metal conduit, galvanized steel with 1/2" diameter hole for round galvanized or stainless steel rod, approximately 54 pounds per 100 units.
  - 2. Riser Clamps: For supporting 5" rigid metal conduit, galvanized steel with 2 bolts and nuts and 4" ears, approximately 510 pounds per 100 units.
  - 3. Reducing Couplings: Steel rod reducing coupling, 1/2" x 5/8" galvanized or stainless steel approximately 16 pounds per 100.
  - 4. C-Clamps: Malleable iron, 1/2" rod size, approximately 70 pounds per 100 units.
  - 5. I-Beam Clamps: Steel, 1-1/4" x 3/16" stock, 3/8" cross bolt, flange width 2", approximately 52 pounds per 100 units.
  - 6. One-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel, approximately 7 pounds per 100 units. Include with backing plates.
  - 7. Two-Hole Conduit Straps: For supporting 3/4" rigid metal conduit, galvanized steel, 3/4" strap width, and 2-1/8" between center of screw holes.
  - 8. Round Steel Rod: Hot dipped galvanized or Stainless Steel, 1/2" diameter, approximately 67 pounds per 100 feet.
  - 9. Hexagon Nuts: For 1/2" rod size, galvanized steel, approximately 4 pounds per 100 units.
  - 10. Offset Conduit Clamps: For supporting 2" rigid metal conduit, steel approximately 200 pounds per 100 units.
- C. Anchors: Provide anchors of types, sizes and materials as required and having the following construction features:
  - 1. Lead Expansion Anchors: 1/2", approximately 38 pounds over 100 units.
  - 2. Toggle Bolts: Springhead, 3/16" x 4", approximately 5 pounds per 100 units.
  - 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering anchors which may be incorporated into the work include, but are not limited to the following:
    - a. Abbeon Cal Inc.

- b. Ackerman Johnson Fastening System Inc.
  - c. Elcen Metal Products Co.
  - d. Ideal Industries, Inc.
  - e. Joslyn Mfg. and Supply Co.
  - f. McGraw Edison Co.
  - g. Rawplug Co. Inc.
  - h. Star Expansion Bolt Co.
- D. U-Channel Strut System:
- 1. Provide U-Channel strut system for supporting electrical equipment, 16-gage hot dip galvanized steel or stainless steel, of types and sizes required: construct with 9/16" diameter holes, 8" on center on top surface, and with the following fittings which mate and match with U-channel:
    - a. Fixture Hangers
    - b. Channel Hangers
    - c. End caps
    - d. Beam clamps
    - e. Wiring stud
    - f. Thinwall conduit clamps
    - g. Rigid conduit clamps
    - h. Conduit hangers
    - i. U-bolts
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturers offering channel system which may be incorporated in the work include, but are not limited to, the following:
    - a. B-Line System, Inc.
    - b. Elcen metal Products Co.
    - c. Greenfield Mfg Co., Inc.
    - d. Midland-Ross Corp.
    - e. Power-Strut Div., Van Huffel Tube Corp.
    - f. Unistrut Div, GTE Products Corp.
- E. General Requirements:
- 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  - 3. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 4. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- F. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

## 2.02 FABRICATED SUPPORTING DEVICES

- A. Pipe Sleeves: Provide pipe sleeves of one of the following:
- 1. Sheet-Metal: Fabricate from galvanized sheet metal round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate from the following gages: 3" and smaller, 20 gage,; 4" or 6", 16 gage; over 6", 14 gage.
  - 2. Steel-Pipe: Fabricate from Schedule 40 galvanized steel pipe; remove burrs.
  - 3. Iron-Pipe: Fabricate from cast-iron or ductile-iron pipe; remove burrs.
  - 4. Plastic-Pipe: Fabricate from Schedule 80 PVC plastic pipe; remove burrs.

- B. Sleeve Seals: Provide Lead and Oakum sleeve seals, caulked between sleeve and pipe for sleeves located in foundation walls below grade or in exterior walls.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
- D. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- E. Unless specifically indicated or approved by Engineer/Architect, do not provide support from suspended ceiling support system or ceiling grid.
- F. Unless specifically indicated or approved by Engineer/Architect, do not provide support from roof deck.
- G. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- H. Equipment Support and Attachment:
  - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
  - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
  - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
  - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
- I. Secure fasteners according to manufacturer's recommended torque settings.
- J. Remove temporary supports.
- K. Tighten sleeve seal nuts until sealing grommets have expanded to form a watertight seal.
- L. Coordinate all conduit penetrations into the building from the exterior with Division 1.

#### **3.03 FIELD QUALITY CONTROL**

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION**

**SECTION 260533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Electrical metallic tubing (EMT).
- E. Underground PVC Conduit (PVC)
- F. Conduit fittings.
- G. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262100 - Low-Voltage Electrical Service Entrance: Additional requirements for electrical service conduits.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2005.
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT) 2005.
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.
- E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2012.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
- H. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
- I. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.
- J. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
- K. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
  - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
  - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

- B. Sequencing:
  - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
  - 1. Indicate proposed arrangement for conduits to be installed within structural concrete slabs, where permitted.
  - 2. Include proposed locations of roof penetrations and proposed methods for sealing.
- D. Project Record Documents: Record actual routing for conduits 3/4" trade size and larger, conduits 3/4" trade size and larger, and conduits 3/4" trade size and larger.

### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

## **PART 2 PRODUCTS**

### **2.01 CONDUIT APPLICATIONS**

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Exterior, Direct-Buried: Use Rigid PVC Conduit
  - 2. Where rigid pvc conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
  - 3. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use galvanized steel rigid metal conduit elbows for bends.
- D. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT).
- E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).
- G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- J. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- K. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
  - 1. Maximum Length: 6 feet (1.8 m).
- L. Connections to Vibrating Equipment:



1. Dry Locations: Use flexible metal conduit.
2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
4. Vibrating equipment includes, but is not limited to:
  - a. Motors.

## 2.02 CONDUIT REQUIREMENTS

- A. Existing Work: Where existing conduits are indicated to be reused, they may be reused only where they comply with specified requirements, are free from corrosion, and integrity is verified by pulling a mandrel through them.
- B. Electrical Service Conduits: Also comply with Section 262100.
- C. Fittings for Grounding and Bonding: Also comply with Section 260526.
- D. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- E. Provide products listed, classified, and labeled as suitable for the purpose intended.
- F. Minimum Conduit Size, Unless Otherwise Indicated:
  1. Branch Circuits: 3/4 inch (21 mm) trade size.
  2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
  3. Control Circuits: 1/2 inch (16 mm) trade size.
- G. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## 2.03 GALVANIZED STEEL RIGID METAL CONDUIT RMC

- A. Manufacturers:
  1. Allied Tube & Conduit: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Republic Conduit: [www.republic-conduit.com/#sle](http://www.republic-conduit.com/#sle).
  3. Wheatland Tube, a Division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
  4. Or Approved Equal.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
  2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.
  4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

## 2.04 FLEXIBLE METAL CONDUIT FMC

- A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- B. Fittings:
  1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  2. Material: Use steel or malleable iron.

## 2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT LFMC

- A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

## **2.06 ELECTRICAL METALLIC TUBING EMT**

- A. Manufacturers:
  1. Allied Tube & Conduit; \_\_\_\_\_: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Republic Conduit: [www.republic-conduit.com/#sle](http://www.republic-conduit.com/#sle).
  3. Wheatland Tube, a Division of Zekelman Industries; \_\_\_\_\_: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Or Approved Equal.
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.
  4. Connectors and Couplings: Use compression (gland) or set-screw type.
    - a. Do not use indenter type connectors and couplings.

## **2.07 ACCESSORIES**

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil (0.51 mm).
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).
- D. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- E. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Methods of Installation:
  1. Cut conduits straight, properly ream, and cut threads for heavy wall conduit deep and clean.
  2. Field-bend conduit with benders designed for purpose so as not to distort nor vary internal diameter.
  3. Size conduits for fill of 40% or less per Chapter 9 tables of NEC, Minimum conduit size shall be 3/4".
  4. Conduits when entering watertight enclosures shall be secured with a myers hub.

5. Fasten conduit terminations in sheet metal enclosures by 2 locknuts, and terminate with bushing. Install locknuts inside and outside enclosure.
  6. Install conduits as not to damage or run through structural members.
  7. Test every conduit run installed with ball mandrel. Clear and restore/repair and conduit which rejects ball mandrel.
  8. Provide permanent plastic tags at each end of embedded conduit run stating what the conduit is serving and where it is served from including the location.
  9. Label all junction boxes (larger than 6" x 6"); pull boxes, wireways with engraved plastic nameplates.
  10. Run all underground conduit under the slab in the dirt and hunt from the slab except for miscellaneous 3/4" conduits which may be run in the slab (with approval from Structural Engineer) if the below stated conditions are met. The depth shall vary as required to avoid underground plumbing. Run in slab when turning up. Hang conduit to slab with stainless steel rods looped around conduit with stainless steel washer to keep loop closed on one end; the other end is to have a 90 degree bend set into slab or looped around reinforcing rods. Use 1/4" diameter rod for conduit up to 2", 3/8" diameter for conduit 2 1/2" or greater in diameter. Space supports no greater than 4' apart, or as required by the National Electrical Code and local codes.
  11. Install underground conduits minimum of 24" below finished grade. Use 36" radius long fittings only.
  12. Exposed Conduits:
    - a. Install exposed conduits and extensions from concealed conduit systems neatly, parallel with, or at right angles to walls of the building.
- E. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
  2. When conduit destination is indicated without specific routing, determine exact routing required.
  3. Conceal all conduits unless specifically indicated to be exposed.
  4. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
    - c. Within joists in areas with no ceiling.
  5. Arrange conduit to maintain adequate headroom, clearances, and access.
  6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
  8. Route conduits above water and drain piping where possible.
  9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.
  10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.
  11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:
    - a. Heaters.
    - b. Hot water piping.
    - c. Flues.
  12. Group parallel conduits in the same area together on a common rack.
- F. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- G. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  3. Use suitable adapters where required to transition from one type of conduit to another.
  4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
  6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
  8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- I. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where conduits are subject to earth movement by settlement or frost.
- J. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
  2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
- K. Provide grounding and bonding in accordance with Section 260526.

### **3.03 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

**END OF SECTION**

**SECTION 260533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).
- C. Boxes and enclosures for integrated power, data, and audio/video.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.13 - Conduit for Electrical Systems:
  - 1. Conduit bodies and other fittings.
  - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- F. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- G. Section 262726 - Wiring Devices:
  - 1. Wall plates.
  - 2. Additional requirements for locating boxes for wiring devices.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2012.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.
- E. NEMA OS 2 - Nonmetallic Outlet Boxes, Device Boxes, Covers and Box Supports 2013.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.
- M. UL 1203 - Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Project Record Documents: Record actual locations for outlet and device boxes, pull boxes, cabinets and enclosures, floor boxes, and underground boxes/enclosures.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. See Section 016000 - Product Requirements, for additional provisions.
  2. Keys for Lockable Enclosures: Two of each different key.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 BOXES**

- A. General Requirements:
  1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

- B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use suitable concrete type boxes where flush-mounted in concrete.
  4. Use suitable masonry type boxes where flush-mounted in masonry walls.
  5. Use raised covers suitable for the type of wall construction and device configuration where required.
  6. Use shallow boxes where required by the type of wall construction.
  7. Do not use "through-wall" boxes designed for access from both sides of wall.
  8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
  10. Nonmetallic Boxes: Comply with NEMA OS 2, and list and label as complying with UL 514C.
  11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  13. Minimum Box Size, Unless Otherwise Indicated:
    - a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.
  14. Wall Plates: Comply with Section 262726.
  15. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hubbell Incorporated; Bell Products; \_\_\_\_\_: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - c. Hubbell Incorporated; RACO Products; \_\_\_\_\_: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - d. O-Z/Gedney, a brand of Emerson Electric Co; \_\_\_\_\_: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - f. Or Approved Equal.
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
    - a. Indoor Clean, Dry Locations: Type 12 painted steel.
    - b. Outdoor Locations: Type 3R, painted steel.
  3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  4. Cabinets and Hinged-Cover Enclosures, Other Than Junction and Pull Boxes:
    - a. Provide lockable hinged covers, all locks keyed alike unless otherwise indicated.
    - b. Back Panels: Painted steel, removable.
    - c. Terminal Blocks: Provide voltage/current ratings and terminal quantity suitable for purpose indicated, with 25 percent spare terminal capacity.
  5. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
  6. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
    - c. Hubbell Incorporated; Wiegmann Products: [www.hubbell-wiegmann.com/#sle](http://www.hubbell-wiegmann.com/#sle).

- D. Boxes and Enclosures for Integrated Power, Data, and Audio/Video: Size and configuration as indicated or as required with partitions to separate services; field-connected gangable boxes may be used.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide separate boxes for emergency power and normal power systems.
- E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.
- G. Unless otherwise indicated, boxes may be surface-mounted where exposed conduits are indicated or permitted.
- H. Round boxes are not acceptable where conduit must enter box through side of box.
- I. Provide knockout closures to cap unused knockout holes where blanks have been removed.
- J. Box Locations:
  - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required where approved by the Architect.
  - 2. Unless dimensioned, box locations indicated are approximate.
  - 3. Locate boxes as required for devices installed under other sections or by others.
    - a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 262726.
  - 4. Locate boxes so that wall plates do not span different building finishes.
  - 5. Locate boxes so that wall plates do not cross masonry joints.
  - 6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.
  - 7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.
  - 8. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.
    - a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.
    - b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.
  - 9. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
- K. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.



2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  3. Installation Above Suspended Ceilings: Do not provide support from ceiling grid or ceiling support system.
  4. Use far-side support to secure flush-mounted boxes supported from single stud in hollow stud walls. Repair or replace supports for boxes that permit excessive movement.
- L. Install boxes plumb and level.
- M. Flush-Mounted Boxes:
1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
  2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.
- N. Install boxes as required to preserve insulation integrity.
- O. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- P. Close unused box openings.
- Q. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- R. Provide grounding and bonding in accordance with Section 260526.
- S. Identify boxes in accordance with Section 260553.

### **3.03 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### **3.04 PROTECTION**

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION**



**SECTION 260553**  
**IDENTIFICATION FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Exposed conduit color banding
- B. Cable/Conductor Identification
- C. Operation Instructions and Warnings
- D. Danger Signs
- E. Equipment/System Identification Signs
- F. Voltage markers.
- G. Underground warning tape.
- H. Floor marking tape.

**1.02 REFERENCE STANDARDS**

- A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011.
- B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NFPA 70E - Standard for Electrical Safety in the Workplace 2015.
- E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.
- B. Sequencing:
  - 1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.
  - 2. Do not install identification products until final surface finishes and painting are complete.

**1.04 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

**1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70 and NFPA 70E

**1.06 FIELD CONDITIONS**

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

**PART 2 PRODUCTS****2.01 ELECTRICAL IDENTIFICATION MATERIALS**

- A. General: Except as otherwise indicated, provide manufacturer's standard products of categories and types required for each application. Where more than single type is specified for an application, selection is Installer's option, but provide single selection for each

application.

- B. Color-Coded Conduit Markers: Provide manufacturer's standard pre-printed, flexible or semi-rigid, permanent, plastic-sheet conduit markers. Except as otherwise indicated, provide lettering which indicates voltage of conductor(s) in conduit. Unless otherwise indicated or required by governing regulations, provide orange markers with black letters.
- C. Arc Fault Stickers: Contractor shall provide and install all arc fault stickers as required by NFPA 70E. Contractor shall provide all fault current studies necessary to provide appropriate stickers on all equipment.
- D. Cable/Conductor Identification Bands: Provide manufacturer's standard vinyl-cloth, self-adhesive cable/conductor wire markers or wrap-around type, numbered to show circuit identification.
- E. Self-adhesive Plastic Signs: Provide manufacturer's standard, self-adhesive or pressure-sensitive, pre-printed, flexible vinyl signs for operational instructions or warnings, of sizes suitable for application areas and adequate for visibility. Unless otherwise indicated or required by governing regulations, provide orange signs with black lettering.
- F. Danger Signs: Provide Manufacturer's standard "Danger" signs of baked enamel finish on 20-gage steel, of standard red, black, and white graphics for adequate vision (as examples: "High Voltage", "Keep Away", "Buried Cable", "Do Not Touch Switch").
- G. Engraved Plastic-Laminate Signs: Provide engraved stock melamine plastic-laminate, complying with FS L-P-387 in sizes and thicknesses indicated.
  - 1. Thickness: 1/16", for units up to 20 sq. in. or 8" length, 1/8" for larger units.
  - 2. Fasteners: Self-tapping stainless steel screws, except contact-type permanent adhesive where screws cannot or should not penetrate substrate.
- H. Manufacturers: Subject to compliance with requirements.

## 2.02 LETTERING AND GRAPHICS

- A. Coordinate names, abbreviations, and other designations used in electrical identification work with corresponding designations shown or specified for schedule. Provide numbers, lettering and wording as indicated or, if not otherwise indicated, as recommended by manufacturers or as required for proper identification and operation/maintenance of electrical system and equipment.
- B. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Panelboards:
      - 1) Identify ampere rating.
      - 2) Identify voltage and phase.
      - 3) Identify power source and circuit number. Include location when not within sight of equipment.
      - 4) Identify main overcurrent protective device. Use identification label for panelboards with a door. For power distribution panelboards without a door, use identification nameplate.
      - 5) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces.
  - 2. Service Equipment:
    - a. Use identification nameplate to identify each service disconnecting means.
  - 3. Use voltage marker to identify highest voltage present for each piece of electrical equipment.
  - 4. Use identification nameplate to identify equipment utilizing series ratings, where permitted, in accordance with NFPA 70.
  - 5. Use identification label to identify overcurrent protective devices for branch circuits serving fire alarm circuits. Identify with text "FIRE ALARM CIRCUIT".

6. Use field-painted floor markings, floor marking tape, or warning labels to identify required equipment working clearances.
    - a. Field-Painted Floor Markings: Alternating black and white stripes, 3 inches (76 mm) wide, painted in accordance with Section 099123 and 099113.
  7. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
    - a. Service equipment.
    - b. Motor control centers.
    - c. Elevator control panels.
  8. Arc Flash Hazard Warning Labels: Comply with Section 260573.
  9. Use warning signs to identify electrical hazards for entrances to all rooms and other guarded locations that contain exposed live parts operating at 600 V nominal or less with the word message "DANGER; Electrical hazard; Authorized personnel only" or approved equivalent.
- C. Identification for Raceways:
1. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  2. Use underground warning tape to identify underground raceways.
- D. Identification for Devices:
1. Use engraved wallplate to identify serving branch circuit for all receptacles.

### **2.03 VOLTAGE MARKERS**

- A. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.
- B. Minimum Size:
1. Markers for Equipment: 1 1/8 by 4 1/2 inches (29 by 110 mm).
- C. Legend:
1. Markers for Voltage Identification: Highest voltage present.
- D. Color: Black text on orange background unless otherwise indicated.

### **2.04 UNDERGROUND WARNING TAPE**

- A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).
- C. Legend: Type of service, continuously repeated over full length of tape.
- D. Color:

### **2.05 FLOOR MARKING TAPE**

- A. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminated, 3 inches (76 mm) wide, with alternating black and white stripes.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. General Installation Requirements:
1. Coordination: Where identification to be applied to surfaces which require finish, install identification after completion of painting.

2. Regulations: Comply with governing regulations and requests of governing authorities for identification of electrical work.
- C. Conduit Identification:
1. General: Apply color-coded identification on electrical conduit in a manner similar to piping identification. Except as otherwise indicated, use a color that matches surroundings as coded color for conduit.
- D. Cable/Conductor Identification:
1. Apply cable/conductor identification on each box/enclosure/cabinet where wires are present, match identification with marking system used in panelboards, shop drawings, contract documents, and similar previously established identification for project electrical work.
  2. All conductors shall be clearly and permanently identified, and color coded per NEC.
  3. All control circuit and instrument circuit terminations shall be identified. For conductors #6 and smaller, conductor color-coding shall be color insulation. For conductor color coding of work larger than #6, use self-adhesive wrap around tape markers. Use markers for all panelboards, boxes, outlets, switches, circuit breakers and control centers.
  4. Operational Instructions and Warnings: Wherever reasonably required to ensure safe and efficient operation and maintenance of electrical and other related systems, and equipment, including prevention of misuse of electrical facilities by unauthorized personnel, install self-adhesive plastic signs or similar equivalent identification, instructions or warnings on switches, outlets and other control devices and covers of electrical enclosures.
- E. Equipment/System Identification:
1. Install engraved plastic-laminate sign on each major unit of electrical equipment in the building unless unit is specified with its own self-explanatory identification.
  2. Provide text matching terminology and numbering of the contract documents and shop drawings. Provide signs for the following categories of electrical work:
    - a. Panelboards, electrical cabinets and enclosures
    - b. Access panel/doors to electrical facilities
    - c. Major electrical substation and switchboard
    - d. Disconnect/safety switches
    - e. Telecommunications switching equipment
    - f. Fire Alarm Master Station

#### **4.01 FIELD QUALITY CONTROL**

- A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

**END OF SECTION**

**SECTION 262416  
PANELBOARDS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Power distribution panelboards.
- B. Lighting and appliance panelboards.
- C. Overcurrent protective devices for panelboards.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 260573 - Power System Studies: Additional criteria for the selection and adjustment of equipment and associated protective devices specified in this section.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e, with Amendment (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards 2009.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2014.
- E. NEMA PB 1 - Panelboards 2011.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.
- G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2013.
- H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- I. UL 67 - Panelboards Current Edition, Including All Revisions.
- J. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
  - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  - 3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
  - 4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
  - 5. Notify Engineer/Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

**1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and

accessories.

1. Include characteristic trip curves for each type and rating of overcurrent protective device upon request.
- B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
  1. Include dimensioned plan and elevation views of panelboards and adjacent equipment with all required clearances indicated.
  2. Include wiring diagrams showing all factory and field connections.
  3. Clearly indicate whether proposed short circuit current ratings are fully rated or, where acceptable, series rated systems.
  4. Include documentation of listed series ratings upon request.
  5. Coordinate Fault Current ratings with Study.
- C. Source Quality Control Test Reports: Include reports for tests designated in NEMA PB 1 as routine tests.
- D. Field Quality Control Test Reports.
- E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- F. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- G. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  1. Panelboard Keys: Two of each different key.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

#### **1.08 FIELD CONDITIONS**

- A. Maintain ambient temperature within the following limits during and after installation of panelboards:
  1. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).



**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. ABB/GE; \_\_\_\_\_: [www.geindustrial.com/#sle](http://www.geindustrial.com/#sle).
- B. Eaton Corporation; \_\_\_\_\_: [www.eaton.com/#sle](http://www.eaton.com/#sle).
- C. Schneider Electric; Square D Products; \_\_\_\_\_: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
- D. Siemens Industry, Inc; \_\_\_\_\_: [www.usa.siemens.com/#sle](http://www.usa.siemens.com/#sle).
- E. Or Approved Equal.
- F. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

**2.02 PANELBOARDS - GENERAL REQUIREMENTS**

- A. Provide products listed, classified, and labeled as suitable for the purpose intended.
- B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
  - 1. Altitude: Less than 6,600 feet (2,000 m).
- C. Short Circuit Current Rating:
  - 1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as determined by short circuit study performed in accordance with Section 260573.
  - 2. Listed series ratings are not acceptable.
- D. Main Breaker: Configure for top or bottom incoming feed as indicated or as required for the installation.
- E. Branch Mounted Main Circuit Breakers are not allowed.
- F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.
- G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
  - 1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.
  - 2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.
- H. Conductor Terminations: Suitable for use with the conductors to be installed.
- I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
  - 1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
    - a. Indoor Clean, Dry Locations: Type 1.
    - b. Outdoor Locations: Type 12/3R.
  - 2. Boxes: Galvanized steel unless otherwise indicated.
    - a. Cabinets shall be of such size as to allow a wiring gutter space of at least 6" all around for power panels, and 4" all around for lighting panels.
    - b. Provide painted steel boxes for surface-mounted panelboards where indicated, finish to match fronts.
  - 3. Fronts:
    - a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
    - b. Finish for Painted Steel Fronts: Manufacturer's standard grey unless otherwise indicated.
  - 4. Lockable Doors: All locks keyed alike unless otherwise indicated.
- J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

- K. Each Panelboard shall be complete with main tin plated copper bus run up the center and neutral bars where required and all proper sequence phase connections. Polarized panelboards will not be accepted. Capacities of copper busses and connections shall be based on a maximum density of 1000 amps per sq. in. spacing of busses shall not be less than code requirements.
- L. Busses shall be arranged as indicated on the drawings. Busses shall be provided with suitable phase identification.
- M. Directory holder with metal frame shall be furnished and installed upon the door of each cabinet, with complete typewritten circuit schedule inserted.
- N. The inside and outside of panelboard boxes, doors and trims shall be furnished with at least two coats of manufacturer's standard finish paint over a baked-on prime coat.
- O. Provide ground bus. Provide additional isolated ground bus where specified.
- P. Lighting and Appliance Panels: Panels shall be for use on voltage phase, number of wire system, 60 cycle, solid neutral service, with number and size of bolt-on type circuit breaker branches as shown on the drawings. Circuit breaker's interrupting capacity shall be 10,000 RMS symmetrical amperes unless otherwise noted.
- Q. Power and Distribution Panels:
  - 1. Power and distribution panels shall be the dead-front type, with hinged doors, with fusible circuit breakers in the branches as indicated on the drawings. The panels shall be suitable for 208/120 volt, 3-Phase, 4-wire or 480/277 volt, 3-phase, 4-wire supply as shown.

### **2.03 POWER DISTRIBUTION PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Copper suitable for terminating copper conductors only.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase and Neutral Bus Material: Copper.
  - 2. Ground Bus Material: Copper.
- D. Circuit Breakers:
  - 1. Provide bolt-on type.
  - 2. Provide thermal magnetic circuit breakers unless otherwise indicated.
  - 3. Provide electronic trip circuit breakers where indicated.
  - 4. Provide shunt trip circuit breakers where indicated.
- E. Enclosures:
  - 1. Provide surface-mounted enclosures unless otherwise indicated.
  - 2. Nema 1 Indoors, Nema 12/3R outdoors.

### **2.04 LIGHTING AND APPLIANCE PANELBOARDS**

- A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.
- B. Conductor Terminations:
  - 1. Main and Neutral Lug Material: Copper suitable for terminating copper conductors only.
  - 2. Main and Neutral Lug Type: Mechanical.
- C. Bussing:
  - 1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
  - 2. Phase and Neutral Bus Material: Copper.

3. Ground Bus Material: Copper.
- D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.
- E. Enclosures:
  1. Provide surface-mounted enclosures as indicated.
- F. Provide column-width panelboards with accessory column-width cable trough and pullbox where indicated.

## 2.05 OVERCURRENT PROTECTIVE DEVICES

- A. Molded Case Circuit Breakers:
  1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      - 1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.
      - 2) 14,000 rms symmetrical amperes at 480 VAC.
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  3. Conductor Terminations:
    - a. Provide mechanical lugs unless otherwise indicated.
    - b. Provide compression lugs where indicated.
    - c. Lug Material: Copper suitable for terminating copper conductors only.
  4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
    - a. Provide field-adjustable magnetic instantaneous trip setting for circuit breaker frame sizes 225 amperes and larger.
  5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
  6. Provide the following circuit breaker types where indicated:
    - a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
    - b. Ground Fault Equipment Protection Circuit Breakers: Designed to trip at 30 mA for protection of equipment.
    - c. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.
    - d. Current Limiting Circuit Breakers: Without using fusible elements, designed to limit the let-through energy to a value less than the energy of a one-half cycle wave of the symmetrical prospective current when operating within its current limiting range.
  7. Provide listed switching duty rated circuit breakers with SWD marking for all branch circuits serving fluorescent lighting.
  8. Provide listed high intensity discharge lighting rated circuit breakers with HID marking for all branch circuits serving HID lighting.
  9. Do not use tandem circuit breakers.
  10. Do not use handle ties in lieu of multi-pole circuit breakers.
  11. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.
  12. Provide the following features and accessories where indicated or where required to complete installation:
    - a. Shunt Trip: Provide coil voltage as required for connection to indicated trip actuator.
    - b. Handle Pad-Lock Provision: For locking circuit breaker handle in OFF position.

## 2.06 SOURCE QUALITY CONTROL

- A. Factory test panelboards according to NEMA PB 1.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.
- C. Verify that mounting surfaces are ready to receive panelboards.
- D. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship).
- B. Install products in accordance with manufacturer's instructions.
- C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.
- D. Secure all panelboards to building structure/walls to comply with tightening torques specified to UL stds. 486A and B.
- E. Panelboard loads shall be balanced between phases.
- F. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- G. Install panelboards plumb.
- H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.
- I. Mount floor-mounted power distribution panelboards on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 033000.
- J. Provide grounding and bonding in accordance with Section 260526.
  - 1. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on isolated/insulated ground bus.
- K. Install all field-installed branch devices, components, and accessories.
- L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.
- M. Set field-adjustable circuit breaker tripping function settings per load study.
- N. Provide filler plates to cover unused spaces in panelboards.
- O. Provide circuit breaker lock-on devices to prevent unauthorized personnel from de-energizing essential loads for the following:
  - 1. Fire detection and alarm circuits.
  - 2. Communications equipment circuits.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Test GFCI circuit breakers to verify proper operation.
- D. Test shunt trips to verify proper operation.
- E. Procure services of a qualified manufacturer's representative to observe installation and assist in inspection, testing, and adjusting. Include manufacturer's reports with field quality control submittals.
- F. Correct deficiencies and replace damaged or defective panelboards or associated components.

**3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

- B. Adjust alignment of panelboard fronts.
- C. Load Balancing: For each panelboard, rearrange circuits such that the difference between each measured steady state phase load does not exceed 20 percent and adjust circuit directories accordingly. Maintain proper phasing for multi-wire branch circuits.

**3.05 CLEANING**

- A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

**END OF SECTION**



**SECTION 262726  
WIRING DEVICES****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section □id #874□- Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush Mounted (General Specification) 2014g, with Amendment (2017).
- C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- D. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.
- E. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (R 2010).
- F. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2012.
- G. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- H. UL 20 - General-Use Snap Switches Current Edition, Including All Revisions.
- I. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- J. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- K. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.
- L. UL 1310 - Class 2 Power Units Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
  - 3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.
  - 4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
  - 5. Coordinate the core drilling of holes for poke-through assemblies with the work covered under other sections.
  - 6. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.
- B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting are complete.

### **1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Samples: One for each type and color of device and wall plate specified.
- C. Field Quality Control Test Reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data:
  1. GFCI Receptacles: Include information on status indicators.
- F. Project Record Documents: Record actual installed locations of wiring devices.

### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

## **PART 2 PRODUCTS**

### **2.01 GENERAL**

- A. Provide factory-fabricated wiring devices, in types, colors, and electrical ratings for applications indicated and complying with NEMA stds. Pub. No. WD or as required. Unless otherwise noted device cover plates shall be high abuse nylon or stainless steel in industrial locations.

### **2.02 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with 20 ampere rating minimum and not less than that of the branch circuit.
- C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.
- D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.
- E. Provide GFCI protection for receptacles installed in kitchens.
- F. Provide GFI protection for all receptacles serving electric drinking fountains. Use GFCI Breaker for GFI protection.
- G. Unless noted otherwise, do not use combination switch/receptacle devices.

### **2.03 WIRING DEVICE FINISHES**

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices Installed in Finished Spaces: White with stainless steel wall plate.
- C. Wiring Devices Installed in Unfinished Spaces: White with stainless steel wall plate.
- D. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.



**2.04 WALL SWITCHES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 2. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 3. Or Approved Equal.
- B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable FS W-S-896; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- C. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

**2.05 RECEPTACLES**

- A. Manufacturers:
  - 1. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 2. Lutron Electronics Company, Inc; Designer Style: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 4. Or Approved Equal.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498 and where applicable FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
  - 1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
  - 2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.
  - 3. Tamper Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; single or duplex as indicated on the drawings.
- D. GFCI Receptacles:
  - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
    - a. Provide test and reset buttons of same color as device.
  - 2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.
  - 3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
- E. USB Charging Devices:
  - 1. USB Charging Devices - General Requirements: Listed as complying with UL 1310.
    - a. Charging Capacity - Two-Port Devices: 2.1 A, minimum.
  - 2. USB Charging/Tamper Resistant Receptacle Combination Devices: Two-port (Type A) USB charging device and receptacle, commercial specification grade, duplex, 20A, 125V, NEMA 5-20R, listed and labeled as tamper resistant type; rectangular decorator style.

## 2.06 WALL PLATES

- A. Manufacturers:
  - 1. Hubbell Incorporated: [www.hubbell-wiring.com/#sle](http://www.hubbell-wiring.com/#sle).
  - 2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 3. Lutron Electronics Company, Inc; \_\_\_\_\_: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  - 4. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 5. Or Approved Equal.
- B. Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard; \_\_\_\_\_.
  - 3. Screws: Metal with tamper-resistant heads finished to match wall plate finish.
- C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.
- D. Weatherproof Covers for Damp Locations: Gasketed, cast aluminum, with self-closing hinged cover and corrosion-resistant screws; listed as suitable for use in wet locations with cover closed.
- E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### 3.03 INSTALLATION

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
  - 1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switches: 48 inches (1200 mm) above finished floor.
    - b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.
  - 2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
  - 3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.
  - 4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Engineer/Architect to obtain direction prior to proceeding with work.

5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.
- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- O. Identify wiring devices in accordance with Section 260553.

### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Prior to energizing circuitry, test wiring devices for electrical continuity and proper polarity connections. After energizing circuitry, test wiring devices to demonstrate compliance with requirements.
- C. Inspect each wiring device for damage and defects.
- D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- E. Correct wiring deficiencies and replace damaged or defective wiring devices.

### **3.05 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

### **3.06 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**END OF SECTION**



**SECTION 265100  
INTERIOR LIGHTING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Emergency lighting units.
- C. Exit signs.
- D. Ballasts and drivers.
- E. Lamps.
- F. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 260529 - Hangers and Supports for Electrical Systems.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- D. Section 262726 - Wiring Devices: Manual wall switches and wall dimmers.
- E. Section 265600 - Exterior Lighting.

**1.03 REFERENCE STANDARDS**

- A. 47 CFR 15 - Radio Frequency Devices current edition.
- B. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low-Pressure Sodium Lamps (Multiple-Supply Type) 2002.
- C. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements 2011.
- D. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Cor 1, 2012).
- E. IES LM-63 - IESNA Standard File Format for Electronic Transfer of Photometric Data and Related Information 2002 (Reaffirmed 2008).
- F. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products 2008.
- G. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; Illuminating Engineering Society 2015.
- H. NECA 1 - Standard for Good Workmanship in Electrical Construction 2010.
- I. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems 2006.
- J. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems 2006.
- K. NEMA LE 4 - Recessed Luminaires, Ceiling Compatibility 2012.
- L. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. NFPA 101 - Life Safety Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- N. UL 844 - Luminaires for Use in Hazardous (Classified) Locations Current Edition, Including All Revisions.
- O. UL 924 - Emergency Lighting and Power Equipment Current Edition, Including All Revisions.
- P. UL 935 - Fluorescent-Lamp Ballasts Current Edition, Including All Revisions.
- Q. UL 1029 - High-Intensity-Discharge Lamp Ballasts Current Edition, Including All Revisions.
- R. UL 1598 - Luminaires Current Edition, Including All Revisions.

- S. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.
  - 2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.
  - 3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.
  - 4. Notify Engineer/Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

#### **1.05 SUBMITTALS**

- A. Shop Drawings:
  - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
  - 2. Provide photometric calculations where luminaires are proposed for substitution 10 days prior to bid date for Engineer Approval.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
  - 1. LED Luminaires:
    - a. Include estimated useful life, calculated based on IES LM-80 test data.
    - b. Include IES LM-79 test report upon request.
  - 2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.
  - 3. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.
- C. Field quality control reports.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

### **1.08 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

## **PART 2 PRODUCTS**

### **2.01 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.

### **2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Recessed Luminaires:
  - 1. Ceiling Compatibility: Comply with NEMA LE 4.
  - 2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.
  - 3. Luminaires Recessed in Sloped Ceilings: Provide suitable sloped ceiling adapters.
- H. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.
- I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

### **2.03 EMERGENCY LIGHTING UNITS**

- A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
- B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.
- C. Battery:
  - 1. Sealed maintenance-free lead calcium unless otherwise indicated.

2. Size battery to supply all connected lamps, including emergency remote heads where indicated.
- D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.
- E. Provide low-voltage disconnect to prevent battery damage from deep discharge.
- F. Self-Diagnostics: Provide units that self-monitor functionality and automatically perform testing required by NFPA 101 where indicated; provide indicator light(s) to report test and diagnostic status.
- G. Accessories:
  1. Provide compatible accessory mounting brackets where indicated or required to complete installation.
  2. Provide compatible accessory high impact polycarbonate vandal shields where indicated.
  3. Provide compatible accessory wire guards where indicated.
  4. Where indicated, provide emergency remote heads that are compatible with the emergency lighting unit they are connected to and suitable for the installed location.

#### **2.04 EXIT SIGNS**

- A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
  1. Number of Faces: Single or double as indicated or as required for the installed location.
  2. Directional Arrows: As indicated or as required for the installed location.
- B. Self-Luminous Exit Signs: Internally illuminated by tritium gas sealed inside phosphor lined gas tubes, requiring no electrical power to operate, with a service life of 20 years unless otherwise indicated.

#### **2.05 BALLASTS AND DRIVERS**

- A. Ballasts/Drivers - General Requirements:
  1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Fluorescent Ballasts:
  1. All Fluorescent Ballasts: Unless otherwise indicated, provide high frequency electronic ballasts complying with ANSI C82.11 and listed and labeled as complying with UL 935.
    - a. Input Voltage: Suitable for operation at voltage of connected source, with variation tolerance of plus or minus 10 percent.
    - b. Total Harmonic Distortion: Not greater than 10 percent.
    - c. Power Factor: Not less than 0.95.
    - d. Ballast Factor: Normal ballast factor between 0.85 and 1.15, unless otherwise indicated.
    - e. Sound Rating: Class A, suitable for average ambient noise level of 20 to 24 decibels.
    - f. Lamp Compatibility: Specifically designed for use with the specified lamp, with no visible flicker.
    - g. Lamp Current Crest Factor: Not greater than 1.7.
    - h. Provide end of lamp life automatic shut down circuitry for T5 and smaller diameter lamp ballasts.
    - i. Surge Tolerance: Capable of withstanding characteristic surges according to IEEE C62.41.2, location category A.
    - j. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class A, non-consumer application.
    - k. Ballast Marking: Include wiring diagrams with lamp connections.



**2.06 LAMPS**

- A. Lamps - General Requirements:
  - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
  - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
  - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
  - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the Engineer/Architect to be inconsistent in perceived color temperature.

**2.07 ACCESSORIES**

- A. Stems for Suspended Luminaires: Steel tubing, minimum 1/2" size, factory finished to match luminaire or field-painted as directed.
- B. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.
- C. Provide accessory plaster frames for luminaires recessed in plaster ceilings.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

**3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

**3.03 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).
- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Furnish and set all inserts, anchors, studs, and hangers for the support of lighting fixtures and respective equipment, and make all necessary adjustments as required.
- G. In acoustical tile ceiling with concealed mechanical suspension system and in gypboard or plaster ceilings, recessed troffers shall be flanged type fixtures. In acoustical tile ceilings with exposed mechanical suspension systems, troffers shall be lay-in type.
- H. For any type ceiling provide sufficient support for fixtures, either arrange with other subcontractors to strengthen ceiling or support fixtures from structure above independently of ceiling. Regardless of whether or not the ceiling can support the fixtures, provide securing wiring on fixture to structure. Provide a minimum of two securing wires to 2x4, 2x2, etc. NOTE:

Securing wires are not the same as support wires. Securing wires are for preventing a fixture from falling into a space if the ceiling fails under a fire situation.

- I. All lay-in fixtures shall be connected to grid system with hurricane clips.
- J. Fixtures to be installed in or on painted ceilings and/or walls shall not be installed until painting is completed. Fixtures installed with paint applied over factory finishes will be rejected.
- K. Suspended Ceiling Mounted Luminaires:
  - 1. Do not use ceiling tiles to bear weight of luminaires.
  - 2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
  - 3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.
  - 4. Secure pendant-mounted luminaires to building structure.
  - 5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
  - 6. In addition to ceiling support wires, provide two galvanized steel safety wire(s), minimum 12 gage, connected from opposing corners of each recessed luminaire to building structure.
- L. Recessed Luminaires:
  - 1. Install trims tight to mounting surface with no visible light leakage.
  - 2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.
  - 3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.
- M. Suspended Luminaires:
  - 1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.
  - 2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.
  - 3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.
  - 4. Install canopies tight to mounting surface.
  - 5. Unless otherwise indicated, support pendants from swivel hangers.
- N. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.
- O. Install accessories furnished with each luminaire.
- P. Bond products and metal accessories to branch circuit equipment grounding conductor.
- Q. Emergency Lighting Units:
  - 1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.
- R. Install lamps in each luminaire.
- S. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.
- T. Night Lights shall be on non-motorized breakers.

### **3.04 FIELD QUALITY CONTROL**

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer/Architect.

**3.05 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer/Architect. Secure locking fittings in place.
- B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Engineer/Architect or authority having jurisdiction.
- C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Engineer/Architect or authority having jurisdiction.

**3.06 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

**3.07 CLOSEOUT ACTIVITIES**

- A. Demonstration: Demonstrate proper operation of luminaires to Engineer/Architect, and correct deficiencies or make adjustments as directed.
- B. Just prior to Substantial Completion, replace all lamps that have failed.

**3.08 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION**



## **SECTION 271000 STRUCTURED CABLING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Communications system design requirements.
- B. Communications pathways.
- C. Copper cable and terminations.
- D. Fiber optic cable and interconnecting devices.
- E. Communications equipment room fittings.
- F. Communications outlets.
- G. Communications grounding and bonding.
- H. Communications identification.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products.
- F. Section 262726 - Wiring Devices.

#### **1.03 REFERENCE STANDARDS**

- A. EIA/ECA-310 - Cabinets, Racks, Panels, and Associated Equipment Revision E, 2005.
- B. NECA/BICSI 568 - Standard for Installing Commercial Building Telecommunications Cabling 2006.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices 1988a (Reaffirmed 2012).
- E. TIA-526-14 - Optical Power Loss Measurement of Installed Multimode Fiber Cable Plant 2015c.
- F. TIA-568 (SET) - Commercial Building Telecommunications Cabling Standard Set 2018.
- G. TIA-568.2 - Balanced Twisted-Pair Telecommunications Cabling and Components Standards 2009c, with Addendum (2016).
- H. TIA-569 - Telecommunications Pathways and Spaces 2015d, with Addendum (2016).
- I. TIA-606 - Administration Standard for Telecommunications Infrastructure 2017c.
- J. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2015c, with Addendum (2017).
- K. UL 444 - Communications Cables Current Edition, Including All Revisions.
- L. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.
- M. UL 1651 - Fiber Optic Cable Current Edition, Including All Revisions.
- N. UL 1863 - Communications-Circuit Accessories Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider. Pay for all utility work.
  2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.
  3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.
  4. Notify Engineer of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
- B. Arrange for Communications Service Provider to provide service.
- C. Preinstallation Meeting: Convene one week prior to commencing work of this section to review service requirements and details with Communications Service Provider representative.

#### **1.05 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- B. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
- C. Evidence of qualifications for installer.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.
- E. Test Plan: Complete and detailed plan, with list of test equipment, procedures for inspection and testing, and intended test date; submit at least 60 days prior to intended test date.
- F. Field Test Reports.
- G. Project Record Documents: Prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).
1. Record actual locations of outlet boxes and distribution frames.
  2. Show as-installed color coding, pair assignment, polarization, and cross-connect layout.
  3. Identify distribution frames and equipment rooms by room number on drawings.
- H. Operation and Maintenance Data: List of all components with part numbers, sources of supply, and operation and maintenance instructions; include copy of project record documents.

#### **1.06 QUALITY ASSURANCE**

- A. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- B. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.
- C. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:
1. Employing a BICSI Registered Communications Distribution Designer (RCDD).
  2. Supervisors and installers factory certified by manufacturers of products to be installed.
  3. Employing BICSI Registered Cabling Installation Technicians (RCIT) for supervision of all work.
- D. Products: Listed, classified, and labeled as suitable for the purpose intended.
- E. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.

- B. Keep stored products clean and dry.

## **1.08 WARRANTY**

- A. Correct defective Work within a 2 year period after Date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.01 SYSTEM DESIGN**

- A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.
  - 1. Comply with TIA-568 (SET) (cabling) and TIA-569 (pathways) (commercial standards).
  - 2. Comply with Communications Service Provider requirements.
  - 3. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.
  - 4. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.
- B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.
  - 1. Locate main distribution frame as indicated on the drawings.
  - 2. Capacity: As required to terminate all cables required by design criteria plus minimum 25 percent spare space.
- C. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

### **2.02 PATHWAYS**

- A. Conduit: As specified in Section 260533.13; provide pull cords in all conduit.
- B. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.

### **2.03 COPPER CABLE AND TERMINATIONS**

- A. Copper Horizontal Cable:
  - 1. Description: 100 ohm, balanced twisted pair cable complying with TIA-568.2 and listed and labeled as complying with UL 444.
  - 2. Cable Type - Voice and Data: TIA-568.2 Category 6 UTP (unshielded twisted pair); 23 AWG.
  - 3. Cable Capacity: 4-pair.
  - 4. Cable Applications: Use listed NFPA 70 Type CMP plenum cable unless otherwise indicated.
- B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.
- C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.
  - 1. Performance: 500 mating cycles.
  - 2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

### **2.04 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES**

- A. Fiber Optic Backbone Cable:
  - 1. Cable is existing and shall be re-used.
- B. Fiber Optic Interconnecting Devices:
  - 1. Connector Type: Type ST.

## 2.05 COMMUNICATIONS EQUIPMENT ROOM FITTINGS

- A. Copper Cross-Connection Equipment:
  - 1. Patch Panels for Copper Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum; cabling terminated on Type 110 insulation displacement connectors; printed circuit board interface.
    - a. Jacks: Non-keyed RJ-45, suitable for and complying with same standard as cable to be terminated; maximum 48 ports per standard width panel.
    - b. Capacity: Provide ports sufficient for cables to be terminated plus 25 percent spare.
    - c. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - d. Provide incoming cable strain relief and routing guides on back of panel.
- B. Fiber Optic Cross-Connection Equipment:
  - 1. Patch Panels for Fiber Optic Cabling: Sized to fit EIA/ECA-310 standard 19 inch (482.6 mm) wide equipment racks; 0.09 inch (2.2 mm) thick aluminum.
    - a. Adapters: As specified above under FIBER OPTIC CABLE AND INTERCONNECTING DEVICES; maximum of 24 duplex adaptors per standard panel width.
    - b. Labels: Factory installed laminated plastic nameplates above each port, numbered consecutively; comply with TIA-606.
    - c. Provide incoming cable strain relief and routing guides on back of panel.
    - d. Provide rear cable management tray at least 8 inches (203 mm) deep with removable cover.
    - e. Provide dust covers for unused adapters.
- C. Backboards: Interior grade plywood without voids, 3/4 inch (19 mm) thick; UL-labeled fire-retardant.
  - 1. Size: As indicated on drawings.
  - 2. Do not paint over UL label.
- D. Equipment Frames, Racks and Cabinets:
  - 1. Component Racks: EIA/ECA-310 standard 19 inch (482.6 mm) wide.
  - 2. Floor Mounted Racks: Aluminum or steel construction with corrosion resistant finish; vertical and horizontal cable management channels, top and bottom cable troughs, and grounding lug.

## 2.06 COMMUNICATIONS OUTLETS

- A. Outlet Boxes: Comply with Section 260533.16.
  - 1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.
- B. Wall Plates:
  - 1. Comply with system design standards and UL 514C.
  - 2. Accepts modular jacks/inserts.
  - 3. Wall Plate Material/Finish - Flush-Mounted Outlets: Match wiring device and wall plate finishes specified in Section 262726.

## 2.07 GROUNDING AND BONDING COMPONENTS

- A. Comply with TIA-607.
- B. Comply with Section 260526.

## 2.08 IDENTIFICATION PRODUCTS

- A. Comply with TIA-606.
- B. Comply with Section 260553.

## 2.09 SOURCE QUALITY CONTROL

- A. Factory test cables according to TIA-568 (SET).



## **PART 3 EXECUTION**

### **3.01 INSTALLATION - GENERAL**

- A. Comply with latest editions and addenda of TIA-568 (SET) (cabling), TIA-569 (pathways), TIA-607 (grounding and bonding), NECA/BICSI 568, NFPA 70, and SYSTEM DESIGN as specified in PART 2.
- B. Comply with Communication Service Provider requirements.
- C. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.
- D. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

### **3.02 INSTALLATION OF PATHWAYS**

- A. Install pathways with the following minimum clearances:
  - 1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.
  - 2. 12 inches (300 mm) from power conduits and cables and panelboards.
  - 3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.
  - 4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.
- B. Conduit, in Addition to Requirements of Section 260533.13:
  - 1. Arrange conduit to provide no more than the equivalent of two 90 degree bend(s) between pull points.
  - 2. Conduit Bends: Inside radius not less than 10 times conduit internal diameter.
  - 3. Arrange conduit to provide no more than 100 feet (30 m) between pull points.
  - 4. Minimum Cover - Underground Service Entrance: Comply with NFPA 70 and Communications Service Provider requirements.
- C. Outlet Boxes:
  - 1. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of telecommunications outlets provided under this section.
    - a. Mounting Heights: Unless otherwise indicated, as follows:
      - 1) Telephone and Data Outlets: 18 inches (450 mm) above finished floor.
    - b. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.
    - c. Provide minimum of 24 inches (600 mm) horizontal separation between flush mounted outlet boxes installed on opposite sides of fire rated walls.
    - d. Unless otherwise indicated, provide separate outlet boxes for line voltage and low voltage devices.
    - e. Locate outlet boxes so that wall plate does not span different building finishes.
    - f. Locate outlet boxes so that wall plate does not cross masonry joints.

### **3.03 INSTALLATION OF EQUIPMENT AND CABLING**

- A. Cabling:
  - 1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.
  - 2. Do not over-cinch or crush cables.
  - 3. Do not exceed manufacturer's recommended cable pull tension.
  - 4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.
- B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:
  - 1. At Distribution Frames: 120 inches (3000 mm).
  - 2. At Outlets - Copper: 12 inches (305 mm).
- C. Copper Cabling:

1. Category 5e and Above: Maintain cable geometry; do not untwist more than 1/2 inch (12 mm) from point of termination.
  2. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.
  3. Use T568B wiring configuration.
- D. Fiber Optic Cabling:
1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.
  2. Support vertical cable at intervals as recommended by manufacturer.
- E. Floor-Mounted Racks and Enclosures: Permanently anchor to floor in accordance with manufacturer's recommendations.
- F. Identification:
1. Use wire and cable markers to identify cables at each end.
  2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.
  3. Use identification nameplate to identify cross-connection equipment, equipment racks, and cabinets.

### **3.04 FIELD QUALITY CONTROL**

- A. Comply with inspection and testing requirements of specified installation standards.
- B. Visual Inspection:
1. Inspect cable jackets for certification markings.
  2. Inspect cable terminations for color coded labels of proper type.
  3. Inspect outlet plates and patch panels for complete labels.
- C. Testing - Copper Cabling and Associated Equipment:
1. Test backbone cables for DC loop resistance, shorts, opens, intermittent faults, and polarity between connectors and between conductors and shield, if cable has overall shield.
  2. Test operation of shorting bars in connection blocks.
  3. Category 5e and Above Backbone: Perform near end cross talk (NEXT) and attenuation tests.
  4. Category 5e and Above Links: Perform tests for wire map, length, attenuation, NEXT, and propagation delay.
- D. Testing - Fiber Optic Cabling:
1. Backbone: Perform optical fiber end-to-end attenuation test using an optical time domain reflectometer (OTDR) and manufacturer's recommended test procedures; perform verification acceptance tests and factory reel tests.
  2. Multimode Backbone: Perform tests in accordance with TIA-526-14.
- E. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

**END OF SECTION**

**SECTION 284600  
FIRE DETECTION AND ALARM**

**PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping: Materials and methods for work to be performed by this installer.
- B. Section 087100 - Door Hardware: Electrically operated locks and door holder devices to be monitored and released by fire alarm system. Specifically the overhead coing doors in the corridor.
- C. Section 233300 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

**1.03 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- C. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits 2002 (Cor 1, 2012).
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 72 - National Fire Alarm and Signaling Code Most Recent Edition Cited by Referring Code or Reference Standard.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Proposal Documents: Submit the following with cost/time proposal:
  - 1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  - 2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
  - 3. Certification by Contractor that the system design will comply with Contract Documents.
- C. Evidence of designer qualifications.
- D. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
  - 1. Copy (if any) of list of data required by authority having jurisdiction.
  - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
  - 4. System zone boundaries and interfaces to fire safety systems.
  - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
  - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
  - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
  - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.

9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
  10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
  11. Certification by the manufacturer of the control unit that the system design complies with Contract Documents.
  12. Certification by Contractor that the system design complies with Contract Documents.
  13. Do not show existing components to be removed.
- E. Evidence of installer qualifications.
- F. Evidence of instructor qualifications; training lesson plan outline.
- G. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
  2. Submit documentation of satisfactory inspections and tests.
  3. Submit NFPA 72 "Inspection and Test Form," filled out.
- H. Operating and Maintenance Data: See Section 017800 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
  2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
  3. List of recommended spare parts, tools, and instruments for testing.
  4. Replacement parts list with current prices, and source of supply.
  5. Detailed troubleshooting guide and large scale input/output matrix.
  6. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
  7. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- I. Project Record Documents: See Section 017800 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
  2. "As installed" wiring and schematic diagrams, with final terminal identifications.
  3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- J. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
  2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

### **1.05 QUALITY ASSURANCE**

- A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
  2. Installer Personnel: At least 2 years of experience installing fire alarm systems.

3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
- C. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

#### **1.06 WARRANTY**

- A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
- B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Fire Alarm Control Units and Accessories - Basis of Design: Siemens Building Technologies, Inc.
- B. Fire Alarm Control Units and Accessories - Other Acceptable Manufacturers:
  1. Provide control units made by the same manufacturer.
- C. Substitutions: See Section 016000 - Product Requirements.
  1. For other acceptable manufacturers of control units specified, submit product data showing equivalent features and compliance with Contract Documents.
  2. For substitution of products by manufacturers not listed, submit product data showing features and certification by Contractor that the design will comply with Contract Documents. 10 day prior to bid approval required.

#### **2.02 FIRE ALARM SYSTEM**

- A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
  1. Provide all components necessary, regardless of whether shown in Contract Documents or not.
  2. Protected Premises: Entire building shown on drawings.
  3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
    - a. ADA Standards.
    - b. The requirements of the local authority having jurisdiction.
    - c. Applicable local codes.
    - d. Contract Documents (drawings and specifications).
    - e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
  4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
- B. Supervising Stations and Fire Department Connections:
  1. Public Fire Department Notification: By on-premises supervising station.
  2. Means of Transmission to Remote Supervising Station: Digital alarm communicator transmitter (DACT), 2 telephone lines.
- C. Circuits:
  1. Initiating Device Circuits (IDC): Class B, Style A.
  2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
  3. Notification Appliance Circuits (NAC): Class B, Style W.
- D. Spare Capacity:
  1. Initiating Device Circuits: Minimum 25 percent spare capacity.
  2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
  3. Speaker Amplifiers: Minimum 25 percent spare capacity.

4. Fire Alarm Control Units: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- E. Power Sources:
  1. Primary: Dedicated branch circuits of the facility power distribution system.
  2. Secondary: Storage batteries.
  3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
  4. Each Computer System: Provide uninterruptible power supply (UPS).

### 2.03 EXISTING COMPONENTS

- A. On-Premises Supervising Station: Include as part of this work all modifications necessary to existing supervising station to accommodate new fire alarm work.

### 2.04 FIRE SAFETY SYSTEMS INTERFACES

- A. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
  1. Duct smoke detectors.
- B. HVAC:
  1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.
- C. Doors:
  1. Smoke Barrier Door Magnetic Holders: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor. Refer to Section 087100.

### 2.05 COMPONENTS

- A. General:
  1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
  2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
- B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.
- C. Master Control Unit: As specified for Basis of Design above, or equivalent.
- D. Initiating Devices:
  1. Addressable Systems:
    - a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
    - b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
  2. Manual Pull Stations: \_\_\_\_\_.
    - a. Provide 1 extra.
  3. Smoke Detectors: \_\_\_\_\_.
    - a. Provide 1 extra.
  4. Duct Smoke Detectors: \_\_\_\_\_.
    - a. Provide 1 extra.
  5. Heat Detectors: \_\_\_\_\_.
    - a. Provide 1 extra.
- E. Notification Appliances:
- F. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
- G. Locks and Keys: Deliver keys to Owner.
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.

1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
  2. Provide one for each control unit where operations are to be performed.
  3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
  4. Provide extra copy with operation and maintenance data submittal.
- I. Storage Cabinet for Spare Parts and Tools: Steel with baked enamel finish, size appropriate to quantity of parts and tools.
1. Padlock eye and hasp for lock furnished by Owner.
  2. Locate as directed by Owner.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and Contract Documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain Owner's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

### **3.02 INSPECTION AND TESTING FOR COMPLETION**

- A. Notify Owner 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with Contract Documents.
- H. Diagnostic Period: After successful completion of inspections and tests, Operate system in normal mode for at least 14 days without any system or equipment malfunctions.
  1. Record all system operations and malfunctions.
  2. If a malfunction occurs, start diagnostic period over after correction of malfunction.
  3. At end of successful diagnostic period, fill out and submit NFPA 72 "Inspection and Testing Form."

### **3.03 OWNER PERSONNEL INSTRUCTION**

- A. Provide the following instruction to designated Owner personnel:
  1. Hands-On Instruction: On-site, using operational system.
- B. Administrative: One-hour session(s) covering issues necessary for non-technical administrative staff; classroom:
  1. Initial Training: 1 session pre-closeout.
- C. Basic Operation: One-hour sessions for attendant personnel, security officers, and engineering staff; combination of classroom and hands-on:
  1. Initial Training: 1 session pre-closeout.

### **3.04 CLOSEOUT**

- A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
  1. Be prepared to conduct any of the required tests.
  2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.

3. Have authorized technical representative of control unit manufacturer present during demonstration.
4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
5. Repeat demonstration until successful.

**END OF SECTION**